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Syphilis in the New Born. An Investigation into the Pathology of 21 cases.

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OUT of the 200 cases of still-birth there were a total of 35 cases in which death was due to syphilis; 14 of these have been classified and fully described under Maceration (q.v.). The remaining 21 were cases of neonatal death. In addition to these 35 there were 2 cases in which the child was syphilitic but in which still-birth was due to other causes, *e.g.*, craniotomy, asphyxia, etc., and the presence of syphilis was only discovered by the routine examination of the child and mother. All the 21 cases were, as might be expected, cases of neonatal death, there being no reason apart from such monstrosities as hydrocephalus why syphilis should give rise to difficulty during labour. The duration of life in my series varied from a few moments (No. 3) to 42 days: most of the deaths occurred, however, at about the end of the first week.

Obstetrical History pointing to Syphilis.

Excluding 10 cases in which the mother was a primipara in 7, of the remaining 11 cases there was a history of miscarriages or repeated neonatal deaths. Of the remaining 4, one (No. 19) had had one previous child, now æt. $2\frac{1}{2}$ and in poor health, and the history of the other 3 was not obtained.

1. This formed part of a report to the Medical Research Council on "Still-Birth: its Causes, Pathology and Prevention," based upon a detailed investigation into 200 cases of still-birth and neo-natal death occurring in the Edinburgh Royal Maternity Hospital from August 1st, 1919, to Nov. 30th, 1920, with two appendices.

Signs of active syphilis in the mother.

Only in 3 cases of the 21 were there any signs of active syphilis such as rash, sore throat, condylomata, etc., in the mother. In two of these the Wassermann reaction was strongly positive. In the third (No. 10) the Wassermann test was negative at the sixth month and the blood from the cord was also negative; there had been a miscarriage two years before and condylomata on the vulva were present, but whether these were syphilitic or not is somewhat doubtful, The child, however, had periportal cirrhosis (early) and catarrhal changes in the thyroid, and the mother is at present undergoing a course of anti-syphilitic treatment. None of the other women gave any history of previous clinical signs of syphilis, or of infection.

The Wassermann Reaction.

This was strongly positive in 5, negative in 7, not obtained in 7 others doubtfully positive at the fifth month, twice negative again before birth in one, and previously negative from cord blood, but doubtfully positive 18 days after delivery in one. The cord blood was obtained in only three cases and in all it was negative.

From these cases, but more especially from experience gained during work in the Ante-natal and Venereal Diseases Department of the Royal Maternity Hospital, Edinburgh, it seems evident that while a positive, especially a strongly positive, Wassermann is of immense value in the diagnosis of syphilis, a negative result has but little value, especially in the presence of an obstetrical history of abortions, still-births or neonatal deaths without obvious cause, such as birth injury, albuminuria, diabetes, etc. So much has this been impressed upon us during the last two years, that we do not delay specific treatment in the presence of such a history even though the Wassermann proves negative. In a primigravida there is, of course, no obstetrical history, but here in our experience the disease is less likely to be of the latent type and the Wassermann is more likely to be positive. The following two cases (Nos. 7 and 12) will illustrate this point:—

No. 7. 2-para, æt. 20. First child born at 7 months; lived 11 days. Present labour also premature ($7\frac{1}{2}$ mons.); lived 4 days; died with jaundice. The mother's Wassermann was negative three days after confinement and on two occasions thereafter, the first after a provocative injection of N.A.B. The second Wassermann was taken four months after confinement. The father's Wassermann was also negative after provocative N.A.B. The second child was undoubtedly syphilitic; its liver showed the most marked peri-portal cirrhosis of my series, and was the only liver which was definitely tough on section. The spleen weighed 24 grms., while

the lungs showed well marked thickening of the alveolar walls, and irregular thickening of the pleura, and several miliary gummata. Both parents are at present undergoing specific treatment.

No. 12. Multipara, æt. 40; twice married. First marriage, 1899.

1st child born 1900; normal pregnancy and labour; child alive and very healthy.

2nd child born 1903; normal pregnancy and labour; alive and well.

3rd child born 1905; normal pregnancy and labour; died of jaundice at 11 days.

4th child born 1907; normal pregnancy and labour; child died of jaundice at 11 days.

5th child born 1909; normal pregnancy and labour; child still-born.

6th child born 1910; normal pregnancy and labour; child died of jaundice, 2 days old.

7th. Miscarriage at 2 months; 2nd marriage.

8th child born 1913; normal pregnancy; child alive and well, æt. 7 years.

9th child born 1915; normal pregnancy; stillborn.

10th child born 1917; normal pregnancy; stillborn.

11th child born 1918; normal pregnancy; stillborn.

The first husband of this patient developed "creeping paralysis" two years after marriage and died in ten years. The first six pregnancies were by the first husband; those from the 7th to 12th inclusive by the second, who is said to be healthy.

The mother, anxious for a living child, came under supervision at the third month of the twelfth pregnancy. Wassermann reaction was negative, and she was put upon calcium chloride and advised to have labour induced at $8\frac{1}{2}$ months on account of previous "habitual death" of the fœtus. The pregnancy during the ensuing months appeared to be normal, and at $8\frac{1}{2}$ months labour was induced; a living child was born which developed jaundice immediately after birth and died within twelve hours. As stated in the tables the spleen weighed 55 grms. The Malpighian corpuscles were not visible on section and microscopically it showed comparatively few lymphocytes and a fair number of plasma cells (methyl. green pyronin stain); but the most marked feature was great dilatation of the capillaries in the spleen pulp. The liver showed the presence of vast numbers of large lymphocytes in the sinusoids (the probable origin of which has been discussed under "liver"). There was also a rather well marked degree of peri-portal and fine cirrhosis. The lung showed well-marked thickening of the alveolar walls and vessels, while all the other organs showed no

abnormality even microscopically. Examination of the fœtal organs by Levaditi and dark ground methods proved negative. The Wassermann test six days after delivery was negative, and a third done six weeks afterwards was again negative. The woman looks perfectly healthy, denies any history or possibility of specific infection, and points to her three healthy children as proof of her contention. The husband having emigrated to America about a month before the confinement was unavailable for examination. The mother has now joined him, but had she remained in contact with us she would have been given a course of specific treatment, in spite of her repeated negative Wassermann tests.[1] The histological evidence leaves no doubt about the presence of syphilis.

Antenatal Treatment.

A reference to the tables will show that only two of the mothers had specific antenatal treatment, and that in both these cases it was inadequate. One, a primigravida (No. 8), had received 1.5 grms. N.A.B., but had only come under supervision at the fifth month and was delivered of a syphilitic child at $7\frac{1}{2}$ months. Her Wassermann was doubtfully positive at the fifth month and then negative again before delivery. Her health before and during pregnancy was good, there were no clinical signs of syphilis, and she only came for examination because she discovered that her husband had contracted syphilis 11 years previously, and 10 years before marriage. After a provocative injection her Wassermann was doubtfully positive. She received five intravenous injections of N.A.B. besides mercury and tonics, and the Wassermann was afterwards twice negative.

The only other patient (No. 5) who had antenatal specific treatment did not come under observation till $6\frac{1}{2}$ months; she had condylomata and sore throat and a strongly positive Wassermann. She had only received two injections of N.A.B. when she gave birth to a premature child which showed marked syphilitic changes in its organs.

The effect of early and thorough treatment of the mother was well seen in the case of an infant not included in the present series. The mother, at the beginning of her pregnancy, had a strongly positive Wassermann with signs of secondary syphilis. After treatment the reaction was negative at seventh month, the blood from the cord was negative, the child at birth looked healthy, and its Wassermann was also negative. At the age of six weeks it died

1. A letter was given to this patient on her departure to America to be given to her doctor in case she became pregnant. A few days ago the writer received a letter from a doctor in a New York hospital saying she had been attended there for a three months' abortion. Her Wassermann was again negative.

from catarrhal pneumonia. I examined all the organs microscopically and no trace of syphilitic change could be detected.

Signs of Syphilis in the Child.

These may be classified as follows, it being, of course, understood that in every case more than one, and in most cases several, of the signs were present in combination:—

Prematurity	15
Marasmus (well marked)...	8
Jaundice	6
Enlarged spleen	5
Fibrosis of spleen	3
Interstitial changes in lungs	12
Enlargement of liver	5
Periportal cirrhosis	11
Fine cirrhosis	2
Hæmopoietic cells in liver	5
Spirochætes present in fœtal organs	1
Chondro-epiphysitis (Indefinite in 3 of these) ...	4
Thymus changes	5
Eruptions on body of child	3
Excess of fluid in lateral ventricles	3
Interstitial hæmorrhages in lung	4
Interstitial hæmorrhages (infarction in kidney) ...	1
Extradural hæmorrhage in spinal cord	3
Generalised œdema	3
Child's Wassermann positive	1
Abscess in ligamentum teres	1
Gumma in brain	1
Fibrosis of thyroid with proliferation of cells into acini	5
Catarrhal changes in acini without fibrosis	2
Fibrosis of pancreas	5

Marasmus was present in a well-marked degree in 8 cases, that is in every case that had lived for any considerable number of days. In most of the other cases, even when the child had lived for only 3 or 4 days, a lesser degree of it was present. Atrophy of the thymus, so that it is dark red in colour and difficult to differentiate from the surrounding tissues, is constantly found in these cases. The cortex of the lobules with its lymphoid tissue has generally disappeared so that only the medulla is left. Also a varying degree of fatty change in the liver is generally found. Apart from these there is no constant histological change except those directly due to syphilis, to be presently described. There is

generally found in the lungs, especially in the lower lobes, a terminal œdema and congestion and frequently a more or less generalized catarrhal pneumonia (5 cases), though the latter, like the interstitial changes in the lungs, is as a rule only discovered on microscopic examination.

Jaundice was noted as present in 5 cases, in one of which it was present at birth, and in two others it was present at death though the infants had lived only 12 and 21 hours respectively. In all cases there was periportal cirrhosis in the liver; in two of these there was also fine cirrhosis, while in a third, in which the child had lived only 12 hours, and was intensely jaundiced at death, and probably was so also at birth, there were very marked hæmopoietic changes in the liver. In three of the cases the spleen was markedly enlarged, probably, like the jaundice, a result of the cirrhosis of the liver. In the most marked case of fine cirrhosis which was unassociated with periportal, there was no jaundice, though the child had lived for six weeks, the inference being that the latter form of cirrhosis is more likely to give rise to jaundice than the intercellular or fine variety.

Chondro-epiphysitis.

Only one of the fresh fœtuses showed definite chondro-epiphysitis (Case No. 4 in tables). In three cases its presence was very indefinite, so much so as to be useless in diagnosis. In all cases the lower end of the femur and upper end of the tibia were examined by laying them open in the middle line of the knee in the antero-posterior diameter, while in most the upper end of the femur was also examined. It is possible that an X-ray examination would have shown some rarefaction of bone in the area next to the cartilage, but this was not available. No microscopic examination of the epiphyseal lines has so far been made and this, when carried out, may also reveal some abnormality. But as far as the naked eye examination is concerned, the absence of chondro-epiphysitis seems to be useless in the diagnosis of syphilis at post-mortem examination, and I have ceased to put any reliance upon it.

Presence of the Spirochæte Pallida.

All macerated fœtuses were examined both by dark ground and by Levaditi methods. All fresh fœtuses were examined by dark ground, and where there was the slightest ground for suspecting syphilis a Levaditi examination was carried out in addition. The result was that while the spirochæte was found in 8 of 14 macerated syphilitic fœtuses, among fresh fœtuses it was only found in one. This was Case No. 3, when the child was born at the 8th

month and only lived a few minutes. The lungs showed a very advanced degree of pneumonia alba—the most marked of all my cases, and in them the spirochætes were plentiful in the alveolar walls and among the catarrhal cells and debris filling the alveoli, and to a lesser extent in the walls of the vessels, while very few were found actually in the vessel lumen.

This absence of the spirochæte was particularly unexpected in one case (No. 15 in tables) in which twins were born at $7\frac{1}{2}$ months. The first was born macerated and spirochætes were very numerous in its organs: viz., thyroid, thymus, liver, wall of heart, lungs, spleen, kidneys, suprarenal, uterine wall, and wall of Fallopian tube. The other twin lived for 16 days and then died of catarrhal pneumonia, the lungs also showing very well marked interstitial pneumonia, and the liver an early cirrhosis. No spirochætes were found in spite of searching examination of the organs and placenta, both by the dark ground and Levaditi methods. The placentæ were separate; that of the macerated fœtus was even less vascular than that of the other, though the latter was much less vascular than normal. Both infants were females.

It seems impossible to avoid the conclusion that the spirochæte goes through a definite sexual cycle. Only on this assumption can its repeated absence in proved syphilitic fœtuses be explained.

Thyroid.

In four of my cases the thyroid was the seat of fibrosis, extending throughout the organ. The newly-formed fibrous tissue pressed upon the acini, so that the latter were in most parts destroyed, only a few stray cells remaining among the strands of fibrous tissue. At other parts, however, less destruction of the acini had occurred, but the lumen was filled with cubical cells derived from the lining layer closely fitting into each other and generally vacuolated. In some acini a little colloid could be seen among the cells, in others the proliferated cells entirely filled the lumen and no colloid was visible. Very few normal acini were left (Figs. 1, 2), and the blood vessels had their walls much thickened.

The thyroid fibrosis seemed to have no necessary relationship to the interstitial changes in the thymus as in Case No. 8 (see table). There was a well-marked though patchy change in the thyroid, while in the thymus fibrosis, and even proliferation of reticulum cells, were entirely absent.

In one case (No. 18) there were marked congestion of the thyroid and changes in the acini, the latter being filled with proliferated cubical cells, but there was no fibrosis. The condition of the acini seems, therefore, not to be due to the fibrosis.

In three of the cases of fibrosis of the thyroid the child died suddenly, one (No. 10) had been born at $8\frac{1}{2}$ months on the district and apparently only lived for a few minutes, being dead before arrival of the nurses; the spleen weighed 24 grms. and the liver was cirrhotic, but this would not have caused death so soon or so suddenly. The other case (No. 14) had been born at the 8th month, became jaundiced on the third day and died suddenly on the 11th day without previously presenting any unusual symptoms. There was very marked fibrosis of the thyroid and very few normal acini remained, most being more or less filled with proliferated cells. The thymus in this case showed considerable reticular proliferation, with a peculiar granular condition with enlargement of the corpuscles of Hassal, and it might be supposed that this was, at least, a contributory cause of the sudden death. In the first case mentioned above, however, the thymus showed no reticular proliferation, and only a few of the numerous corpuscles present had undergone granular degeneration. The third case in which sudden death occurred was No. 21, the child appearing previously healthy though two weeks premature. It was found dead in bed beside the mother at 5 a.m. and the question of overlaying arose. There were no signs of asphyxia other than some congestion of the organs, and the sudden death remained unaccounted for until histological examination revealed patchy fibrosis of the thyroid with generalized proliferative change (the acini being filled with cubical cells, and this in areas in which there was no fibrosis), and interstitial changes in the lungs with congestion. The thymus showed no change. It seems therefore possible that the condition of the thyroid may give rise to sudden death, the thymus condition being at most only contributory.

There was also in Case No. 14 rather severe interstitial hæmorrhage in the kidneys, pressing upon the tubules, and mainly confined to the pyramids. The blood had evidently been extravasated just before death, but did not seem in itself sufficient to account for the sudden death. (See Kidney.)

What alterations would have resulted in the development of the child had it survived? Would symptoms of cretinism have become evident or would the gland have become regenerated and new secreting tissue been formed under specific treatment? In the normal fœtal thyroid groups of cells exist among the acini which develop later into fully developed acini. In the fibrotic thyroid of syphilis large numbers of these potential acini still remain, and would no doubt, under treatment, develop into acini producing sufficient colloid to meet the needs of the growing infant.

Thymus.

The thymus gland in syphilis presents no unusual naked eye appearances except in cases in which there is also marasmus. The gland is then small, usually weighs no more than 1 or 2 grms., is dark red in colour and can only with difficulty be distinguished from the surrounding tissues. The normal gland is larger, pale pink in colour, and on squeezing the cut surface matter resembling pus in appearance is exuded. Examined microscopically, however, the "pus" is found to consist of lymphocytes, not polynuclears. In the small gland of marasmus none of this material can be squeezed out, or at most a very small amount.

Microscopically, the thymus frequently presents but little difference from the normal, and this is especially likely to be the case when the syphilis has not been the immediate cause of death, but when the child has died from some intercurrent disease, *e.g.*, pneumonia, or from birth trauma. Even in these, however, some degree of the characteristic changes can be observed. These are very advanced in two of my cases and briefly are as follows:—

1. *Changes in the corpuscles of Hassal.*

In a well-marked case these appear to be larger than normal and they are not confined to the medullary portion of the lobule, but are also numerous in the cortical area immediately under the capsule and the interlobular septa. It is probable, however, that in marasmus the cortical part of the lobule to a large extent disappears and the medulla alone composes the whole lobule. One is inclined to this opinion because of the undue amount of stroma in the entire lobule in cases of marasmus; the stroma in the cortex of the normal lobule is very little in amount and much less than in the medulla where it forms a well-marked open reticulum, in the meshes of which the lymphocytes lie.

There is also a peculiar appearance of the individual corpuscles of Hassal that is found in most of my cases of congenital syphilis, in greater or less degree. This is the replacement, more or less complete, of the corpuscle, by leucocytes, chiefly polymorphonuclear, and by granular debris. In some the replacement is so complete that none of the concentric body is left, while in others some part of the latter is still left in the centre of the otherwise granular mass.

This is also found in an occasional corpuscle of Hassal in the normal thymus, but never to so great an extent as in Case No. 14, in which all the corpuscles were so affected (Figs. 3 and 4) in addition to being larger than usual.

The natural tendency of the corpuscle of Hassal is to undergo granular degeneration. This can be observed in some degree in

every normal specimen. There is a migration of polymorphonuclear leucocytes to the site in order to remove the débris. In syphilis the influence of the specific toxin probably causes the degeneration to take place more generally and rapidly, with the consequent migration of leucocytes to remove what has now become a foreign and degenerate body.

2. *Increase in plasma cells* was very marked in some of my cases, notably in Cases 4 and 14. They occupy the spaces formed by the network of branching reticular cells which are normally occupied by the lymphocytes. They would seem to have replaced the lymphocytes, very few of which are present.

3. *Increase in reticulum cells.*

In some of my cases these cells were remarkably increased in number so as to form a dense structure in marked contrast to the loose reticulum of the normal gland. Lymphocytes were comparatively few in number. In Cases No. 6 and 14 these changes were particularly well marked and there was also extensive fibrosis. The fibrosis seemed to arise entirely from thickening of the capsule and trabeculæ and of the walls of the smaller and larger vessels, especially those in the substance of the gland. So far as could be observed there was no tendency on the part of the reticulum cells themselves to form fibrous tissue.

It is an interesting speculation as to how far such changes in the thymus can be the cause of sudden death. Thus, the infant (No. 14) in which the changes, both in the corpuscles of Hassal and in the stroma, were most marked died suddenly 12 days after birth without previously exhibiting any unusual symptoms except a little jaundice. There were, however, also changes in the other organs, notably in the thyroid, and it is probable that those in the latter were at least contributory causes.

Lung.

In only one case did the lung present the typical naked eye appearance of pneumonia alba. This was Case No. 47 (No. 3 in Syphilitic Table), in which the lungs were voluminous and heavy, were crepitant in some parts, but in others were non-crepitant, presented on section an appearance resembling grey marble, and on squeezing, the cut surface exuded frothy semi-purulent fluid. This appearance was present in both, but was most marked in the right. In all the other cases, however, the lungs, apart from interstitial hæmorrhage, which was present in two cases, or a terminal œdema and congestion of the lower lobes, presented no abnormal naked eye appearance, and it was only on histological examination that the true condition of the lung was revealed.

The histological changes present in the lungs were as follows:

1. *Thickening of the Pleura.* This was present in only a small proportion of cases. It tended to be somewhat irregular and more marked at some parts than others.

2. *Thickening of the alveolar walls* (Figs. 5, 6, 7). This is by far the most common change found and, indeed, was present in almost every case. It must not be mistaken for the thickening of the alveolar wall due to congestion and œdema. The wall may be six or eight times the normal thickness, and the tissue forming it is cellular with a very fine stroma. The cells vary in shape and size, some being small and resembling lymphocytes or plasma cells; others are large, flattened and epithelial-looking, rounded, spindle-shaped, or irregular in outline. These larger cells generally contain pigment and closely resemble in size and shape the phagocytal cells found in the alveoli. On account of the similarity in cell content the wall of the alveolus is sometimes very difficult to distinguish from the lumen. Between the cells there are fine capillaries, but the blood vessels are few in number compared with the normal. The alveolar wall of a congested lung is often much thickened by the mere filling of the vessels, but the number of capillaries is in marked contrast to those in the syphilitic lung. It should be noted that the thickening of the alveolar walls, like that of the pleura, is very irregular, and even in a lung where it is well marked one frequently finds parts in which the wall is no thicker than normal; besides, the interstitial change in the lung appears to have no relationship to the liver changes as in Case 13 (in tables) in which the liver was the seat of a fine cirrhosis, but the lungs were perfectly normal.

3. *The alveoli.* These are very few in number in a well-marked case, chiefly on account of the enormous thickening of the alveolar walls. Those that are present are generally *loosely* filled with granular débris, a few red blood-corpuscles, mostly without pigment, and large numbers of pigment-containing phagocytal cells. The cells are evidently of catarrhal origin, shed from the endothelial lining of the alveoli, the cells of which, even when still *in situ*, also contain much pigment. These phagocytal cells vary in size and shape, but are generally large with irregular outline, and many possess one, two, or three nuclei, or the nucleus may be kidney-shaped or multi-lobular. The filling of the alveoli by these catarrhal cells and débris is a characteristic feature of the syphilitic lung, and on microscopic examination gives it somewhat the appearance of an ordinary catarrhal pneumonia, but on careful examination it will be seen that the alveoli are only *loosely* filled, and that the cells are quite different from those found in catarrhal

pneumonia, the chief difference being the absence of polymorphonuclear cells (Figs. 5, 6, 7).

4. *Thickening of the walls of the blood-vessels and bronchioles.* This is less constantly found and does not appear to have any relationship to the thickening of the alveolar walls, that is, whilst the latter may be definitely thickened the blood-vessels and bronchioles remain normal. The thickening of the vessel wall, when present, appears to be entirely in the medial and adventitial coats and to be confined to the vessels in the interlobular septa, not affecting the capillaries of the alveolar walls. These, however, are mostly obliterated by the cellular proliferation.

5. *Presence of miliary gummata.* In one case only did miliary gummata appear to be present on microscopic examination (No. 7 in tables, Fig. 12). The nodules were circumscribed, but with no connective tissue capsule, and consisted of cells in relation to a small bronchiole, and in them the following types of cells could be recognized:—

(*a*) Lymphocytes (numerous).
(*b*) Plasma cells (numerous).
(*c*) Large cells, probably of endothelial origin, irregular in shape and with large vesicular nucleus.
(*d*) Very few polynuclear leucocytes.

No gummata either in this case or in any other were recognized on naked eye examination.

6. *Massive interstitial hæmorrhages in lungs and other internal organs.* Many cases of congenital syphilis seem to have a tendency to hæmorrhages in various organs. This is well illustrated by Case No. 109 (No. 8 in Syphilis Tables) when the child was born at the 7th month and was noticed to be blue from birth. It died on the second day, and the lungs at post-mortem examination were found to be the seat of massive interstitial hæmorrhages involving the greater part of the lung substance. The blood was found on microscopic examination to fill the alveoli and bronchi so that practically no air-containing alveoli remained. Some of the blood appeared to be fairly old, as if the effusion had taken place during birth, but most was fresh and had apparently been shed shortly before death. There was also in this case a good deal of congestion of the pulmonary capillaries and smaller vessels, and, as we shall see in the section dealing with pneumonia, hæmorrhage is extremely likely to occur into the alveoli and bronchi from the giving way of congested vessels, even in the lung of the non-syphilitic child, but such extensive and massive hæmorrhage involving almost the entire lung were not found in any

condition apart from syphilis. One may frequently see where the vessels have given way, and the blood making its way from the vessel into the surrounding tissues, but it does not appear to be preceded by any aneurysmal dilatation of the wall of the vessel, and is probably due to a general weakening of the vessel wall by the action of the syphilitic toxin. In this particular case there seems to have been a definite hæmorrhagic tendency, as both lateral ventricles were filled with blood clot, and there was extensive blood effusion over all the cerebral surfaces. In Case No. 14 (in tables), in which the child died suddenly on the 12th day after birth without presenting any unusual symptoms except slight jaundice, there was found to be extensive interstitial hæmorrhage in the lungs; and in the kidneys there was marked fresh interstitial hæmorrhage, starting in the pyramids and spreading into the cortex. (See Kidney.) There were also in this case fibrotic changes in the thyroid and thymus, with degeneration of the acini and the corpuscles of Hassal respectively, and these, not the hæmorrhages in the lung and kidney, probably accounted for the sudden death.

In addition to the above, three cases of extradural hæmorrhage occurred in the spinal cord, the bleeding, from its appearance, having apparently occurred just before death (Nos. 9, 11 and 18 in tables).

It was thought that these multiple hæmorrhages might be partly explained by prolongation of the coagulation time of the blood in syphilis, but investigations have not so far borne this out.

Liver.

Only rarely does one observe any naked eye change in the liver in syphilis of the still-born or neonatal infant. Generally the liver is not at all increased in size or weight, but occasionally it is so. Thus in 10 consecutive full-time infants in my series known to be non-syphilitic the liver averaged $^1/_{22}$nd part of the total body weight. In Case 20 in Syphilis Tables, on the other hand, the liver weighed 260 grms., and the total body weight was 3,370 grms., a proportion of $^1/_{13}$th. In Case No. 14 the liver weighed only 80 grms. and the child 1,670 grms., a proportion of 1 in 20, while in No. 13 the liver weighed 190 grms. and the infant 2,300 grms, or $^1/_{12}$th of the body weight. In these syphilitic cases, however, the child is generally marasmic and the body weight therefore less, as the weight of the liver is raised in proportion to that of the body.

In only one case was there any undue toughness of the liver apparent at post-mortem examination (No. 98; No. 7 in Syphilis Table). In this case the surface was perfectly smooth, but the toughness was at once apparent and there was deep bile-staining.

Microscopically the condition was one of very marked periportal cirrhosis.

Microscopically, among my series, the following types of liver change could be distinguished :—

1. *Periportal cirrhosis* (Fig. 8). This was the commonest change and was present in a greater or less degree in 10 of the series of 20. It was most marked in the case referred to above, in which the liver was distinctly tough and much bile stained. In the portal tract in this case there were present numerous lymphocytes, fibroblasts and plasma cells, but in addition there were present peculiar giant cells, with granular protoplasm and a single deeply staining nucleus. Sometimes these cells were arranged in groups of two or three, sometimes singly, but in many cases tended to be surrounded by smaller cubical cells more or less definitely arranged so as to form an acinus, in the centre of which the giant cell lay. They possibly represent attempts at the formation of new bile ducts, as the original ducts seem to have been obliterated by the new fibrous tissue formation.

The type of cell found in the portal canal in the periportal cirrhosis of syphilis varies a good deal, but generally the following types could be distinguished :—

(*a*) A few lymphocytes.
(*b*) Fairly numerous plasma cells.
(*c*) Large elongated or oval cells, containing large, coarse eosinophile granules and without definite cell walls.
(*d*) Fibroblasts and connective tissue cells.

(*a*), (*b*), (*d*) are probably successive stages of the same cell. In one case the periportal cirrhosis was associated with a fine or intercellular cirrhosis (No. 14 in tables); in all the others the periportal cirrhosis was the only abnormality present in the liver except for the frequent presence of hæmopoietic cells in the sinusoids, to be referred to later.

2. *Intercellular or fine cirrhosis* (Fig. 11). This was present in three cases, viz., in Nos. 14 and 19, when it was combined with a periportal cirrhosis, and in Case No. 13 when it existed alone. In this case the intercellular fibrous tissue divided the liver cells into groups of from one to a dozen, but some of the lobules were more affected than others. Both in this and the periportal type there was more or less fibrous thickening of the wall of the hepatic vein in the centre of the lobule.

3. *The hæmopoietic type* (Figs. 9 and 10). In this type there may be no cirrhosis, either periportal or intercellular, but the sinusoids are filled with large numbers of cells of various kinds, chiefly lymphocytes. This is a continuation and exaggeration of

the blood-forming function of the liver found during early fœtal life. If the liver of a five-months' fœtus is examined a somewhat similar condition will be found to be present, but with the great difference that while in the normal early fœtus red blood cells of the nucleated type are present in large numbers, in the hæmopoietic liver of syphilis these are rarely seen. In early fœtal life numerous cells are present amongst the liver cells outside the sinusoids, or, at least, not apparently connected with them, and also in the sinusoids. These cells appear to be budded off from the liver cells which they resemble in every way except in being smaller.[1] They correspond to the primitive mesamœboids of Minot, and can ultimately form both the red blood corpuscle (ichthyoid cell) and the colourless blood corpuscle.

In some of the mesamœboids hæmoglobin makes its appearance, though why it should do so in some and not in others is not apparent. A nucleated cell is thus formed, containing hæmoglobin, but much larger than the fully formed red blood corpuscle and more irregular in shape (ichthyoid cells). The nucleus is possibly afterwards extruded and the non-nucleated cell is thus formed. Different stages of the extrusion of the nuclei can be observed, and many free nuclei are present, much resembling small lymphocytes. In other ichthyoid cells the nucleus appears to be losing its staining properties and is dissolving in the protoplasm of the cell. Once the red cell loses its nucleus, by whatever method it occurs, it becomes more rounded in shape and smaller and thus comes to resemble the adult cell.

The mesamœboids which do not take up hæmoglobin seem to divide and re-divide rapidly, each successive daughter cell having less and less protoplasm, and a nucleus relatively larger in size, until the fully-formed large lymphocyte is formed.

The new cells formed outside the sinusoids increase in number by division, in this way enlarging a space for themselves between and amongst the liver cells until these finally have either formed new sinusoids or break their way into the adjacent existing one. There is no doubt, however, that budding of young liver cells (mesamœboids) also takes place into the sinusoids themselves and the Kupffer's cells do not seem to present any obstacle in the way of their doing so, probably because of their not forming a continuous lining for the sinusoids.

Case No. 12 (in tables) is an example of the abnormal continuation of this blood-forming function of the liver into post-natal life. The sinusoids in this case are filled with cells of various kinds,

1. I am aware that this origin of the primitive blood cell from the liver cells is not admitted by the best authorities, but no serious alternative suggestion appears to have been made. F. J. B.

amongst which the following main types may be distinguished :—

1. *Mesamœboids.* Large cells resembling liver cells in general appearance and staining reaction. They are, however, smaller than liver cells, and seem to be derived from them. They are present in somewhat smaller numbers than in the liver of the normal early fœtus. They may contain only one deeply staining nucleus, but frequently the nucleus is multilobed—probably an evidence of degeneracy. These primitive cells divide rapidly and eventually form the

2. *Large lymphocytes,* cells resembling the large lymphocytes of the normal blood. These and the mesamœboids are present in about equal numbers.

3. *Eosinophile cells.* There are a few of these cells present, and they sometimes lie in groups of two or three. They are large, like myelocytes of bone marrow, and always contain a perfectly rounded nucleus and large coarse eosinophile granules in the protoplasm. They also seem to be derived from liver cells and occasionally a liver cell is seen *in situ* containing coarse granules with a similar staining reaction.

4. *Only very few nucleated red cells* were present, and this formed one of the most striking differences from the normal liver of the early fœtus.

The condition then seems to be a continuation and exaggeration of the normal blood-forming function of the liver found in early fœtal life, with the difference that the new cells formed are almost entirely of the colourless type. The large numbers of these lymphocytes present throughout sections of the liver gave it the appearance of a case of leucocythæmia, but the excess of lymphocytes was confined to the sinusoids and was not found in the central hepatic vein nor in the vessels of the portal canal. Sections of the other organs also failed to reveal any notable increase of white cells. The spleen in this case weighed 55 grms. and was the largest of my series. The liver was also somewhat enlarged—190 grms.—and the child was jaundiced from birth and died within twelve hours.

4. *Cirrhosis combined with atrophy of the central zone of the lobule.* This was especially well marked in Case No. 14, and was there associated with both a periportal and a fine cirrhosis. The cells around the hepatic vein (centre of lobule) were degenerated, their outline faint and the protoplasm granular and faintly staining so that frequently no definite cells could be made out (Fig. 14).

A marked degree of hæmopoiesis was also found in patient No. 10 (in tables) who also had an enlarged liver (160 gms.) and spleen (24 grms.). I think it possible that this is one of the causes of the splenic enlargement so frequently found in syphilis,

and that it acts by interfering with the circulation through the liver and portal system.

Spleen.

Enlargement of the spleen is one of the most reliable signs of congenital syphilis and was definitely present in five of my cases, the weights in these cases varying from 55 grms. to 16 grms. The organ was generally firm with rounded edges, but in one case was noticed to be unusually flabby. In this case (No. 13) the enlargement was unassociated with any increase in the reticulum of the spleen and was probably due to a fine cirrhosis of the liver, causing hyperæmia and distension of the capillaries in the spleen-pulp which, on microscopic examination, however, appeared to be almost completely empty though dilated.

Cause of the enlargement. The enlargement would appear to be associated in almost every case with an accompanying cirrhosis in the liver and to be quite independent of the amount of reticular tissue present in the spleen itself. The relationship between the size of the spleen and the condition of the liver is set forth in the following table:—

(1) Spleen much enlarged. Well marked periportal cirrhosis.
(2) Spleen 4 grms. Poorly marked periportal cirrhosis.
(3) „ 4 „ No cirrhosis.
(4) „ 10 „ Ditto.
(5) „ 7 „ Early periportal cirrhosis. Wall of central hepatic vein thickened.
(6) „ 6 „ Periportal cirrhosis doubtful.
(7) „ 42 „ Periportal cirrhosis extremely well marked. Liver tough and deeply bile-stained.
(8) „ 8 „ (child of $7\frac{1}{2}$ mos.) Early periportal cirrhosis.
(9) „ 9 „ (child full time) No cirrhosis.
(10) „ 24 „ (child $8\frac{1}{2}$ mos.) Periportal cirrhosis and hæmopoiesis marked.
(11) „ 6 „ Periportal cirrhosis doubtful.
(12) „ 55 „ Periportal cirrhosis, fine cirrhosis in patches and marked hæmopoiesis.
(13) „ 24 „ Fine cirrhosis only.
(14) „ 3 „ (Spleen much fibrosed) Periportal and fine cirrhosis well marked.
(15) „ 5 „ No cirrhosis.
(16) „ 16 „ (8 months) Periportal cirrhosis well marked.
(17) „ 5 „ Early periportal cirrhosis.
(18) „ 3 „ Ditto.
(19) „ 7 „ Early periportal and patchy fine cirrhosis.
(20) „ 25 „ Very well marked periportal cirrhosis. (Liver weighed 260 grms.)

An examination of the above statement will show that all cases of enlargement of the spleen were associated with cirrhosis of the liver; that where the cirrhosis was early and commencing, the size of the spleen was but little altered, and when, on the other hand, the liver changes were well marked a corresponding increase in the size of the spleen was found. In the six cases in which the liver was normal the spleen had undergone no increase in size.

In only one case (No. 14) was a small spleen associated with well marked cirrhosis. In this case the cirrhosis was a combination of the periportal and fine types, and therefore one would have expected a marked enlargement of the spleen, but the latter was much fibrosed, its capsule was markedly thickened, and strands of fibrous tissue ran here and there throughout the spleen pulp. At the same time the walls of the vessels were thickened and many of the corpuscles were entirely, or almost entirely, obliterated. The effect of the vascular change would be to diminish the amount of blood circulating in the organ, while the fibrous change, together with the thickening of the capsule and trabeculæ, would prevent expansion and enlargement by the congestion consequent upon the cirrhotic change in the liver. It is well known that the spleen is an elastic and expansile organ and the interference with the portal circulation caused by liver cirrhosis will therefore readily cause enlargement of it. In all the cases of enlargement, excepting one (No. 13), the spleen-pulp was markedly hyperæmic. In this case the liver was the seat of fine cirrhosis; the capillaries of the spleen were widely dilated but almost entirely empty, and the reticulum of the spleen was extremely loose with few cells present in the meshes. It is possible, however, that most of the blood was removed from the capillaries and pulp during the process of fixation.

It would seem that the periportal type of cirrhosis is the most likely to give rise to marked splenic enlargement. Thus in one case in which the spleen weighed 42 grms., the second largest in my series, only periportal cirrhosis was present, but that in a very marked degree. In Case No. 12 the spleen was the largest found and weighed 55 grms.; here the fine cirrhosis was very faintly marked whereas a fairly advanced degree of periportal change was present. In this case the liver was of the hæmopoietic type, the sinusoids being packed with newly-formed white blood cells. This condition was found in only one other case of splenic enlargement (No. 10) in which also it was associated with a periportal cirrhosis. It seems unlikely, however, that this hæmopoiesis can of itself give rise to splenic enlargement by interfering with the liver circulation, especially in view of the fact that this blood-forming function of the liver is normal to fœtal life, though much less pronounced than in syphilis, and it does not then cause enlargement of the spleen.

Histological appearances of the spleen in syphilis.

In the normal spleen the histological appearances vary considerably in different cases even within normal limits. This difference is dependent mainly upon whether the spleen is hyperæmic or the reverse, but to some extent also upon the *amount* of the various elements present. These elements are as follows:—

1. *The Malpighian Bodies.* These are masses of lymphoid tissue developed around the smaller arterioles after they leave the trabeculæ and before they break up into the capillary tufts which eventually open into the pulp. The lymphocytes composing the corpuscles seem to be derived from the wall of the arteriole which they surround, probably from the tunica adventitia. The cells originally arising from the coat are not true lymphocytes, but mononuclear cells containing a fairly large amount of protoplasm and an eccentric nucleus. These cells, by dividing, ultimately give rise to the ordinary small lymphocyte. In some, even normal spleens, a majority of the cells present in the Malpighian body are of the mononuclear type, in others very few of these are present. The process of formation of the lymphocyte in the spleen is thus similar to the method of formation in the liver during fœtal life.

2. *The plasma cells.* These are probably derived from the above described mononuclear cell; the protoplasm of the latter increases in amount and the cell fails to divide to form the lymphocyte. In the normal spleen the number of plasma cells varies considerably; in some there is only an occasional plasma cell present, in others they are fairly plentiful. Their appearance is characteristic and they can be easily recognized in sections stained with pyronin, resorcin and methyl green, the protoplasm then staining a bright red. The origin of these plasma cells from the same source as the lymphocyte is suggested by their being found most plentifully amongst the lymphocytes of the Malpighian body and also by the fact that their protoplasm has similar staining reactions to that of the mononuclear cells above mentioned (the forerunners of the lymphocytes).

3. *The reticulum cells.* These are derived from the endothelial cells lining the venous sinuses and frequently lie in the sinuses. They are large flattened mononuclear cells of irregular shape with an eosinophile protoplasm. They vary much in size and shape, being sometimes small—not larger than the plasma cell. The nucleus differs, however, from that of the latter in being more centrally situated, and the staining reactions are different, and at the same time a certain irregularity in shape is characteristic—the reticulum cell, even when small, can be seen to possess small

pseudopodia. Others are large, flattened, branching cells, and all stages between these two extremes may be observed in favourably stained sections. They are phagocytal and frequently contain red blood corpuscles or diffuse blood-pigment or even a lymphocyte. Their branches tend to join with those of neighbouring reticulum cells, and thus a kind of network is formed, in the meshes of which the spleen pulp lies. Frequently, however, the branches do not join and each reticulum cell lies as an isolated unit. Like the plasma cells the reticulum cells vary much in number within normal limits. Sometimes they are comparatively few in number, at other times they form a fairly dense network. The so-called "splenic cell," also phagocytic, is probably a variation of the reticulum cell. They must not be confused with

4. *The connective tissue cells* forming the fibro-cellular walls of the small vessels in the pulp. In every section large numbers of these are present not evidently in connection with blood vessels, as they have been in many cases, as it were, shaved off from the sides of the latter. They may easily be distinguished from the reticulum cell by their elongated shape, faintly basophile protoplasm, and elongated and pale nucleus.

5. *The elements of the blood, forming the bulk of the spleen pulp.* Red blood corpuscles (in the fœtus a few nucleated reds), lymphocytes, and one or two eosinophiles.

Changes in syphilis.

1. *The Malpighian bodies* may be much diminished in number and size, and this seems to depend upon the obliterating endarteritis met with in many cases of syphilis. No other alteration in their appearance was noted.

2. *The plasma cells.* No constant increase was observed in the numbers of plasma cells. In one or two specimens they were more plentiful than in any of my normal cases (adult or fœtal), but the increase was by no means marked or characteristic.

3. *The reticulum cells.* As pointed out above, the number varies within wide limits in the normal spleen. No characteristic increase was observed in congenital syphilis, and in many of the cases they were scarce and isolated even when the spleen was enlarged. Increase of plasma cells or of reticulum bore no relationship to enlargement of the spleen, neither did the number of plasma cells bear any relationship to that of the reticulum cells. There is no reason to think that the reticulum cells form fibrous tissue, and in the cases in which the spleen was fibrous this seemed to be due entirely to thickening of the tunica adventitia of the arterioles, and to thickening of the capsule and trabeculæ.

The following are brief details of the histological appearances in my cases, with special reference to plasma cells and reticulum cells, together with those from some normal cases as controls. (The numbers correspond to those in the tables.)

1. Spleen much enlarged; plasma cells not numerous; reticulum cells not increased; hyperæmia.
2. Spleen 4 grms.; plasma cells fairly numerous, chiefly in and around Malpighian bodies; reticulum very dense.
4. Spleen 10 grms.; plasma cells plentiful; reticulum cells close and plentiful.
5. Spleen not enlarged; occasional plasma cells; reticulum scarce.
8. Spleen 8 grms.; plasma cells only occasionally found; reticulum fairly dense.
9. Spleen 7 grms.; vessels thickened; Malpighian bodies small; very few plasma cells; reticulum cells plentiful.
10. Spleen 24 grms.; plasma cells moderately plentiful (2 or 3 in a field with the oil immersion lens); reticulum rather scarce.
11. Spleen 6 grms.—fibrosed; thickening of vessel walls; occasional plasma cells; reticulum moderate in amount.
12. Spleen 55 grms.; Malpighian bodies small and few; plasma cells fairly numerous; reticulum not increased and rather loose pulp hyperæmic.
13. Spleen 22 grms.; few plasma cells; reticulum scarce and loose; sinuses dilated and comparatively empty.
14. Spleen 3 grms.; few lymphocytes; Malpighian bodies small and few; fibrosis of spleen; great thickening of adventitia of vessels of capsule and trabeculæ; no plasma cells seen; reticulum cells plentiful, but not abnormally so.
16. Spleen 16 grms. (8 months fœtus, weight 1650 grms.); few plasma cells; reticulum cells rather few and loose.
17. Spleen 5 grms.; occasional plasma cells only; reticulum cells in fair amount.
18. Spleen 3 grms.; only one or two plasma cells seen; reticulum cells in fair amount.
19. Spleen 7 grms.; plasma cells plentiful, especially in Malpighian bodies, only occasional in other parts; reticulum in moderate amount.
21. Spleen 14 grms.; a few plasma cells seen; pulp œdematous.

Normal spleens (controls).

1. Spleen of adult (girl, æt. 21, killed by an accident). Plasma cells plentiful; very nearly as much so as in the syphilitic cases in which they were most marked; reticulum cells fairly dense.

2. Spleen of infant two days old; died of pneumonia; occasional plasma cell; reticulum rather scarce.
3. Spleen of healthy infant one week old, which died suddenly of acute hæmorrhagic pneumonia; occasional plasma cells only; reticulum rather scarce.
4. Spleen from healthy infant five weeks old; died suddenly of acute œdema of the lungs; a few plasma cells seen; reticulum not plentiful.

It will be noted that only in one or two syphilitic cases was the number of plasma cells fairly large; one of these was Case No. 12, in which the spleen weighed 55 grms. The number of plasma cells present could, of course, have nothing to do with this increase in weight as they would not number more than 2 or 3 in an oil immersion field, and in some fields might be entirely absent. The reticulum in this case did not seem increased and the great change present was dilatation and congestion of the sinuses in the pulp. In another case in which the spleen was enlarged (No. 10) the plasma cells were about as plentiful as in the last case, but in two others (Nos. 13 and 16), in which definite enlargement was present the plasma cells were very few, no more plentiful than in the normal spleens, and much less so than in the adult spleen above referred to.

It seems thus legitimate to conclude that the number of plasma cells in the syphilitic spleen is only in a small proportion of cases increased beyond normal, and that this increase is never so great as to be characteristic. Further, the reticulum cells show no definite or constant increase, and their numbers have no relationship to the size of the spleen.

Kidneys.

In only one case was any abnormality observed in the kidneys; this was Case 141 (No. 14 in Syphilis Tables) in which the child, a premature one, died suddenly on the 11th day without previously exhibiting any unusual symptoms, except some jaundice.

Both kidneys were, on section, seen to be hæmorrhagic, the extravasated blood being confined to the pyramids and giving them a very dark red appearance, as compared with the normal cortex. It was remarkable that the hæmorrhagic area was strictly limited to the pyramids and not all of them were affected, one or two in each kidney remaining apparently normal (Fig. 15).

Microscopically. The most marked feature was the presence of extravasated blood in the medulla (Fig. 13). It was strictly confined to the pyramids, except here and there where it extended into the cortex, along the narrow zone immediately surrounding some of the

medullary rays; this was, however, very slight and was not apparent to the naked eye. The blood was situated among and between the tubules, but was never found inside them. The collecting tubules, however, contained an opaque, faintly eosinophile fluid, and occasionally a little of this could be observed in the intertubular tissue.

The kidney, as a whole, was considerably congested, this being especially well marked in the capillaries of the glomeruli. The cells lining the tubules were swollen and granular, and in many were desquamated, although the latter may have been due to post mortem changes. At the junction between the cortex and medulla two moderate-sized veins were found containing a thrombus (Fig. 12). In neither case did the thrombus seem very recent, while in one it was distinctly laminated and adherent at one side to the wall of the vessel.

The condition would therefore appear to be one of infarction due to thrombosis of certain of the venous arches between the pyramids and the cortex. The absence of hæmorrhage in the cortex is probably accounted for by the free anastomosis which takes place between the cortical capillaries of adjacent interlobular vessels and by the collateral circulation between the cortical vessels and those of the capsule.

Nothing could be discovered at the site of the thrombus to account for the thrombosis in the two vessels affected, such as disease of the tunica intima, and in neither was any general thickening of the vascular coats apparent.

In the vessels in other parts of the section, however, particularly the arterioles, there was marked thickening of the tunica adventitia and also of the tunica intima, so that the lumen in some cases was almost entirely obliterated (Fig. 14). In one instance a small arteriole seemed to be entirely obliterated by a cellular proliferation of the tunica intima, or endothelium. This vascular thickening was very pronounced in the thyroid and thymus, and in these organs was associated with a generalized fibrosis. In the kidney, however, there was no generalized fibrosis present. One or two necrotic glomeruli were found in the cortex.

Pancreas.

There were several cases in which there was well marked fibrosis of the pancreas, a young fibrous tissue making its way between the acini and destroying them. The vessels showed thickening of both intima and adventitia. It was remarkable that the islands of Langerhans seemed to be increased in number. In the normal pancreas of the young infant islands of Langerhans are few in number, but in the fibrotic pancreas of the syphilitic infant there

were frequently found as many as ten in the microscopic field with a $\frac{1}{3}''$ objective (Fig. 16).

Post-mortem diagnosis of syphilis.

In the section on maceration (see Report to Medical Research Council) the difficulty in arriving at a diagnosis of syphilis was discussed and it was pointed out that in the absence of a positive Wassermann reaction and of the spirochæte pallida in the fœtal tissues, all the other points in the case had to be carefully considered, such as the obstetrical history, presence of chondro-epiphysitis, etc. Chief among these was the histological examination of the placenta in which the size and non-vascularity of the villi, and the diminished extent of the intervillous spaces, helped considerably in the diagnosis.

In the fresh fœtus a similar difficulty is often experienced, the Wassermann reaction in the mother, and the examination of the fœtal organs for spirochætes frequently giving negative results even in undoubtedly syphilitic cases. In a small proportion of cases (5 out of 20 in my series) the enlargement of the spleen makes the diagnosis practically certain, and in a much smaller percentage still (1 out of 20) the presence of chondro-epiphysitis will be equally definite. Such minor signs as hard œdema of the body and limbs, massive hæmorrhages into organs, probably due to the action of a capillary toxin, excess of fluid in the lateral ventricles of the brain, especially when they are combined with marasmus and jaundice, will excite suspicion, but at best their evidence is only confirmatory. The lungs, liver, and thyroid show, as a rule, no abnormal naked eye appearances. The lung may appear crepitant, non-œdematous, or only slightly so, it may float buoyantly in water and yet on microscopic examination may present all the characteristic appearances previously described in connection with interstitial pneumonia. Neither does the liver as a rule show any characteristic naked eye changes, even when cirrhosis is well marked microscopically.

The syphilitic placenta.

Examination of the placenta is of less assistance than might be supposed. Holland has shown that in most cases the syphilitic placenta is not in any way abnormal on naked eye examination. It is not enlarged, nor does it weigh abnormally heavy in proportion to the fœtus, especially when it is kept in mind that in the premature fœtus the placenta is normally heavier in proportion to the weight of the body than in the infant at full time. In the case of the macerated fœtus the placenta may or may not be enlarged; the villi are liable

to be non-vascular on account of a cellular proliferation in their stroma obliterating the capillaries, and of an endarteritis obliterating the vessels in the larger stems. Such a condition is not confined to syphilis but may be found in any condition when certain specific toxins circulate in the maternal and fœtal blood, *e.g.*, as in albuminuria. In syphilis, however, the cellular proliferation is usually greater in extent, so that the villi are abnormally thick; in consequence the intervillous spaces are diminished in extent and the placenta is liable to be increased in size and weight, while on account of the absence of blood vessels it is on section much paler than normal, and frequently the thickened vessels can be seen to stand out from the cut surface as white cords. The increase in size, too, expresses itself by an *increased thickness* from the maternal to the fœtal surface.

These large and heavy placentæ are more likely to be found in those cases in which the fœtus is born macerated, the reason being that the non-vascularity of the placenta is the cause of the death of the fœtus in *utero* and the greater the cellular proliferation in the villi the more marked will be the consequent non-vascularity and enlargement and the more certain will be the death of the fœtus in *utero*.

That this statement is only useful as a rough guide, however, is shown by the fact that of 14 macerated syphilitic fœtuses in which the placenta was obtained it weighed 600 grms. and over in only two (770 grms. and 850 grms. respectively), while of the two other definitely enlarged placentæ of macerated fœtuses, one from a case of diabetes weighed 630 grms. (fœtus 4290 grms.), and the other from a case of albuminuria weighed 600 grms. (fœtus 950 grms.). The diabetic placenta, however, though large, was not really abnormally so when compared with the weight of the fœtus, and microscopically the villi were very vascular. The enlarged albuminuric placenta was much infiltrated by old blood clot, and this doubtless accounted for the increased weight.

The placenta of the syphilitic child born at full time apparently healthy is *practically always normal in appearance, size and weight.* Microscopic examination, too, usually fails to reveal any abnormality, the villi being no less vascular than normal. It is this normal amount of vascularity that has permitted the fœtus to develop in *utero* to term. Had it been otherwise death in *utero* or premature birth would have occurred.

In the case of the premature infant, however, microscopic examination will generally show that the villi are less vascular than normal; there are fewer capillaries present and the walls of the arteries in the main villous stems are thicker than they should be in a healthy placenta at a corresponding period of development.

It is probably this premature "ripening" of the placenta that accounts for the premature births so frequently met with in syphilis (15 cases of my series).

Thus, while the placenta may be said to be practically of no value in the diagnosis of syphilis in the full-time infant, in the premature infant and in the macerated fœtus it may afford strong evidence in addition to that gained by examination of the fœtus itself and consideration of the case history.

Histological examination of the fœtus.

As in the case of the macerated fœtus, before arriving at a diagnosis of syphilis, a careful weighing of all the available evidence is necessary, so in the case of the fresh fœtus, with this exception that in the latter we have available the important aid of the histological examination of the fœtal organs, especially the liver, lung, spleen, thyroid, and thymus. The importance of the information thus obtained cannot be over-estimated and in some cases will be the only evidence obtainable.

Summary.

1. Out of 200 cases of still-birth and neonatal death syphilis was the cause of death in 35, or 17.5 per cent.

2. In the presence of a history of repeated abortions, still-births or neonatal deaths, a diagnosis of maternal syphilis should be made and treatment instituted even though the Wassermann reaction is repeatedly negative, provided other obvious and easily ascertained causes can be excluded, such as chronic Bright's disease.

3. A positive Wassermann reaction in these cases is very significant, but a negative reaction has little value, especially in cases of old-standing infection.

4. None of the cases had undergone adequate treatment during pregnancy.

5. There are but few reliable signs of syphilis present on naked eye post-mortem examination. They are more likely to be present in a full-time fœtus than in a premature one, and most syphilitic infants are premature. Naked eye lung changes were present in only one case. The liver usually presents no abnormal appearance, except that it may be pale and somewhat fatty, especially when marasmus has preceded death. Histologically, four types were distinguished.

6. Changes were found in four cases in the thyroid of the nature of fibrosis and proliferation of the cells lining the acini, and absence of colloid.

7. Histological changes in the thymus were found in several

cases. There was marked fibrosis, and a few lymphocytes, but numerous plasma cells were present. The cells of the reticulum were often increased in amount; the corpuscles of Hassal seemed more numerous than normal and the individual corpuscles larger, while the central laminated body had undergone degeneration, and been replaced by granular debris.

8. *Enlargement of the spleen,* practically diagnostic when present, was found only in five cases of my series, the largest weighing 55 grms., namely about six times the normal weight. In all cases the enlargement was associated with periportal cirrhosis of the liver. Histologically, it is of the nature of a hyperplasia with dilatation of the blood sinuses in the pulp. Increase in plasma cells and reticulum is not definite or constant.

9. *Chondro-epiphysitis* was very rarely found; it was definitely present in only one of my cases, and so indefinite in two others as to be useless in post-mortem diagnosis.

10. *The Spirochæta pallida* was found in eight cases of 14 known syphilitic macerated fœtuses, while of the 21 fresh fœtuses it was only found in one. One of these fresh fœtuses in which it was *not* found was the twin of a macerated fœtus in which numerous spirochætes were present. This suggests that the spirochæte goes through a definite sexual cycle.

11. The placenta of the full-time fresh syphilitic fœtus is in most cases little changed on naked eye examination. It is not increased in weight, does not appear unusually large or thick, and presents, as a rule, no characteristic appearance, and even when examined microscopically may seem perfectly normal. That of the syphilitic macerated fœtus is, however, in some cases enlarged and heavy, pale on section, and on microscopic examination the villi are enlarged, fibrous, and non-vascular, and the intervillous spaces diminished in extent. This applies in a lesser degree to the placenta of the premature syphilitic fœtus.

12. In most cases histological examination of the fœtal organs, especially the thyroid, thymus, lung and liver, is necessary before deciding that a case is, or is not, syphilitic. In the absence of a positive Wassermann reaction in the mother and in the presence of a suspicious obstetrical history, histological examination will generally afford conclusive evidence.

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APPENDIX I.—SYPHILIS.

No.	Record No.	Age of Mother.	Parity.	Duration of Pregnancy.	Signs of Syphilis in Mother.	Antenatal Treatment	Signs of Syphilis in Child.	Age of Child.	Sex and Size.	Remarks.
1	11	30	3	7½ mos.		None	Marasmus. Thickening of alveolar walls, of walls of vessels in lungs, and of bronchi. Spleen much enlarged; periportal cirrhosis. Levaditi negative	8 days	F. 1190 grms. 42·5 cm.	Both lungs show patchy broncho-pneumonia and hæmorrhage into alveoli and bronchi
2	13	17	1	8 mos.		None	Marasmic. Vesicular and pustular eruption on body, especially back. Liver 90 grms. Spleen 4 grms. Poorly marked periportal cirrhosis: Corpuscles of Hassal very large and often replaced by more or less necrotic mass of lymphocytes. Thymus very small; 2 grms.	15 days	M. 1600 grms. 45 cm.	
3	47	30	4	8 mos.	Wassermann strongly positive	None	Lungs heavy and voluminous; pneumonia *alba*; great thickening of alveolar walls also of vessels and bronchi. On section lung looks like grey marble. Spirochætes present in large numbers. Liver 145 grms. Spleen 4 grms	Gasped a few times	M. 2300 grms. 41 cm.	Three previous children healthy, full-time. Youngest two alive and well. No periportal cirrhosis
4	73	32	1	9 mos.	Wassermann strongly positive. Has secondary syphilis—rash, sore throat and condylomata	None	Marasmic. Purulent discharge from sinuses in both elbows. R. and L. lower epiphyses of humerus disorganised and necrotic. Other epiphyses showed osteochondritis. Liver 180 grms. Spleen 10 grms. Abscess in ligamentum teres (expanded to form pus sac). Interstitial pneumonia with catarrhal pneumonia superadded. Levaditi negative.	21 days	M. 3000 grms. 52 cm.	No periportal cirrhosis
5	37	33	1	7½ mos.	Condylomata and sore	1	Marasmic and jaundiced. Periportal	9 days	M. 1170 grms.	Cerebral hæmorrhage. Interstitial

						monia with catarrhal pneumonia superadded. Levaditi negative.				
5	27	22	1	7½ mos.	Condylomata and sore throat. Wassermann strongly positive	1 month before delivery 2 N.A.B. injections 0·3 grs. each	Marasmic and jaundiced. Periportal cirrhosis in liver: Lungs showed thickening of alveolar walls and of walls of bronchi and alveoli. Spirochætes absent (dark ground). Epiphyses healthy	9 days	M. 1170 grms. 42 cm.	Cerebral hæmorrhage. Interstitial hæmorrhage in lungs
6	90	20	1	9 mos.	?	None	Marasmic. Fibrosis of thymus and thyroid. Spirochætes absent. Epiphyses healthy	12 days	F. 2470 grms. 52 cm.	No periportal cirrhosis. Liver 90 grms. Spleen 6 grms.
7	98	20	2	8 mos.	First child born at 7 mos. Lived 11 days. Present child premature. No signs of syphilis in mother. Wassermann negative 3 days after birth and on two occasions later. Father also twice negative	None	Periportal cirrhosis. Bile ducts patent. Spleen 42 grms. Walls of alveoli thickened. No chondro-epiphysitis. Pleuræ thickened. Vessels of lungs and bronchioles also thickened. Gummata (miliary) in lung. Levaditi negative	4 days	F. 1700 grms. 48 cm.	Child died with jaundice: liver 100 grms., deeply bile-stained and tough. Mother under treatment at present
8	109	20	1	7½ mos.	Wassermann doubtfully positive at 5th month: twice negative again before birth	Yes 1·5 grs. N.A.B.	Blue from birth. Placenta syphilitic. Œdema of abdominal wall, hands, legs, feet, scalp and vulva. Periportal cirrhosis and hæmopoietic cells in liver. Interstitial fibrosis in lungs. Levaditi negative. No osteochondritis. Fibrosis of thyroid and catarrhal cells fill acini at parts.	2 days	F. 1500 grms. 42 cm.	Extensive hæmorrhage into lung substance and bronchi & alveoli. Blood-staining about mouth and nose. Hæmorrhage in both lateral ventricles

No.	Record No.	Age of Mother.	Parity.	Duration of Pregnancy.	Signs of Syphilis in Mother.	Antenatal Treatment.	Signs of Syphilis in Child.	Age of Child.	Sex and Size.	Remarks.
9	114	20	1	9 mos.	Wassermann doubtfully positive 18 days after delivery: cord blood negative	None	Scaliness of hands and forearms set in on second day; spread over body. Liver 90 grms. Spleen 7 grms. Excess of fluid in L. lateral ventricle. No cirrhosis in liver. Fibrosis of thyroid. Lung alveoli thickened. Levaditi negative	5 days	M. 2820 grms. 54·5cm.	Extensive extra-dural hæmorrhage in lower cervical and upper dorsal region of spinal cord
10	125	21	1	8½ mos.	District case. Placenta 700 grms. Larger villi fibrous: Small seem healthy microscopically	None	Died before arrival of nurses. Liver 160 grms. Periportal cirrhosis well marked: hæmopoietic cells numerous. Spleen 24 grms. Levaditi negative. Thyroid 1 grm. Shows fibrosis and catarrhal cells filling acini	A few mins.	M. 2390 grms. 49 cm.	No cause of death found except condition of thyroid
11	126	18	1	9 mos.	Blood from mother at 6th month negative, also from cord. Doubtfully positive 16 days after delivery. Placenta healthy, naked eye and microscopically	None	Very emaciated. Extra-dural hæmorrhage in spinal cord, cervical, dorsal and lumbar regions. Liver 90 grms. Fatty change in periportal zone of lobules; periportal cirrhosis doubtful. Lung shows thickening of walls of bronchi and vessels. Levaditi negative. Fibrosis of spleen	8 days	M. 2300 grms. 54 cm.	Died of acute gastroenteritis and spinal hæmorrhage
12	133	40	12	8½ mos.	History of repeated still-births and neo-natal deaths. Wassermann negative 3 times (in 3rd month) and after delivery	No specific treatment	Died with jaundice. Liver 190 grms. Marked increase of hæmopoietic cells in liver sinusoids. Periportal and some fine cirrhosis. Lungs normal. Spleen 55 grms. Levaditi negative	12 hours	M. 2870 grms. 49·5 cm.	Labour induced at 8½ mos. on account of habitual death of fœtus. (See Comments.)
13	137	22	2	8½ mos.	Wassermann strongly	None	Wassermann doubtfully positive at	6	F.	Some congestion &

					3rd month) and after delivery		Spleen 55 grms. Levaditi negative			of Ileitis. (See Comments.)
13	137	22	2	8½ mos.	Wassermann strongly positive at 6th month, also one week after delivery. Last child born at 7th month: lived 6 mos. Placenta less vascular than normal. Father has rash and sore throat. Wassermann triple plus	None	Wassermann doubtfully positive at 10 days old. Scaliness of hands and feet appeared 8 days after birth. Coppery rash on buttocks 1 month after birth, followed by desquamation of cutis. Marasmic. Corpuscles of Hassal granular. Liver 190 grms.; fine cirrhosis. Spleen 22 grms. Lungs normal. Indefinite chondro-epiphysitis. Levaditi negative	6 weeks	F. 2300 grms. 52·5cm.	Some congestion & œdema of lungs
14	141	30	5	8 mos.	Mother had left hospital. No record obtainable	None	Became jaundiced on 3rd day. Interstitial hæmorrhage in kidney. Fibrosis of kidney. Periportal and fine cirrhosis in liver (80 grms.). Atrophy of cells in centre of lobules, and the cells contain bile pigment. Spleen 3 grms.; much fibrosed. Vessels, capsule and trabeculæ thickened. Interstitial fibrosis and hæmorrhage in lungs, plus catarrhal pneumonia. Corpuscles of Hassal abnormal. Fibrosis of thyroid. Levaditi negative	11 days	F. 1670 grms. 47·5cm.	Died suddenly on 12th day without presenting any unusual symptoms except jaundice
15	164	40	8	7½ mos.	District case. Twin pregnancy. Other child born macerated and contained spirochætes in organs. Placenta vascular, but less so than that of other twin	None	Marasmic. Lungs showed interstitial change, with catarrhal pneumonia. No change in liver. Nodule of lymphocytes in brain (gumma). Epiphyses normal. No spirochætes found in any organ (Levaditi)	7 days	F. 900 grms. 40·5cm.	Other twin (No 157), also female; two placentas

No.	Record No.	Age of Mother.	Parity.	Duration of Pregnancy	Signs of Syphilis in Mother.	Antenatal Treatment.	Signs of Syphilis in Child.	Age of Child.	Sex and Size.	Remarks.
16	176	18	1	8 mos.	Wassermann strongly negative	None	Liver 100 grms. Spleen 16 grms., very large and firm. Slight chondro-epiphysitis. No spirochætes in fœtal organs. Lung alveoli thickened: vessels and bronchi less so. Increase of hæmopoietic cells in liver	4 days	F. 1650 grms. 42 cm.	Admitted in labour. Pelvis justo minor. Labour spontaneous. Lower lobe of R. lung congested & œdematous
17	177	36	8	7 mos.	Three full-time children. Then 2 miscarriages. Then 2 children who lived 2 days. Wassermann negative (6th month)	None	Œdema of feet and hands. Excess of fluid in lateral ventricles of brain. Extra-dural hæmorrhage in spinal cord—6th cervical to 9th dorsal. Liver 50 grms. Spleen 5 grms. Possibly some chondro-epiphysitis. Lung as (16) liver normal	4 days	M. 1200 grms. 40 cm.	Congestion and œdema of lungs. Cultures from lungs gave pure culture of staphylococcus aureus. No cirrhosis in liver
18	180	34	6	8 mos.	Four children alive and well. Then miscarriage in 1918. Sores (condylomata) on vulva. Wassermann negative at 6th month, also cord blood negative	None	Œdema of body and limbs. Excess of fluid in lateral ventricles. Extra-dural hæmorrhage in spinal cord, upper and mid-dorsal region. Levaditi negative. Extensive recent hæmorrhage into walls of alveoli, in lungs and into bronchi and alveoli. Thyroid contains no colloid, acini filled with catarrhal cells. Early periportal cirrhosis	6 days	F. 1750 grms. 46 cm.	Fatty degeneration of liver, confined to peripheral zone of lobule. Patchy broncho-pneumonia
19	72	32	2	8 mos.	Wassermann not obtained. Previous child	None	Jaundiced from birth. Liver 85 grms. Spleen 7 grms. Liver bile-stained,	5 days	M. 2000 grms. 45 cm.	Lungs intensely congested & œdematous.

						filled with catarrhal cells. Early periportal cirrhosis				
19	72	32	2	8 mos.	Wassermann not obtained. Previous child alive and well, æt. 2½, but husband is not the father of this child	None	Jaundiced from birth. Liver 85 grms. Spleen 7 grms. Liver bile-stained, and showed early periportal and fine cirrhosis. Lungs showed thickening of alveolar walls and pleura, also of vessels of bronchi. Hæmorrhage into some bronchi—occurred at birth. All organs, including brain, examined by Levaditi—result negative. Great proliferation of reticular cells of thymus: Corpuscles of Hassal granular	5 days	M. 2000 grms. 45 cm.	Lungs intensely congested & œdematous.
20	2	26	5	9 mos.	History of still-births and neo-natal deaths. One living child, not strong. Wassermann negative (2 tests)	None	Abdomen tense and prominent. Slight icterus. Liver 260 grms. Cirrhotic (periportal). Spleen 25 grms. Levaditi negative.	21 hours	M. 3370 grms. 47·5 cm.	Mother again pregnant, and child probably dead *in utero*. (Has since given birth to a macerated fœtus)
21	113	17	1	8½ mos.	Wassermann negative. No signs of syphilis. Epileptic and "infantile paralysis" affecting R. arm and leg.	None	Found dead in bed beside mother. Acini of thyroid filled with catarrhal cells—no fibrosis. Hæmopoiesis in liver. Early periportal cirrhosis—110 grms. Spleen 14 grms. Thymus normal. Levaditi negative — no chondro-epiphysitis. Lungs show thickening of alveolar walls and alveoli filled with catarrhal cells	5 days	M. 2720 grms. 49 cm.	

Fig. 1.—From Case 90 (6 in Syphilis Tables). Fibrosis of thyroid. Note acinus filled with proliferated cubical cells.

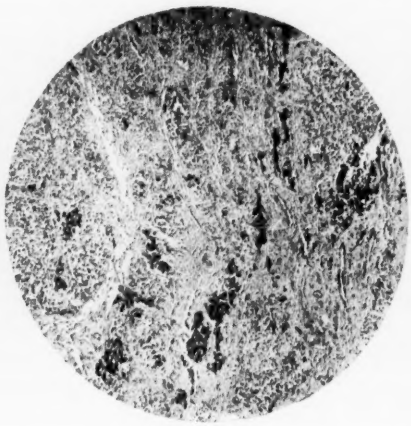

Fig. 2.—From Case 141 (14 in Syphilis Tables). Thyroid: Shows fibrosis with proliferation of cells lining the acini into the lumen and filling it.

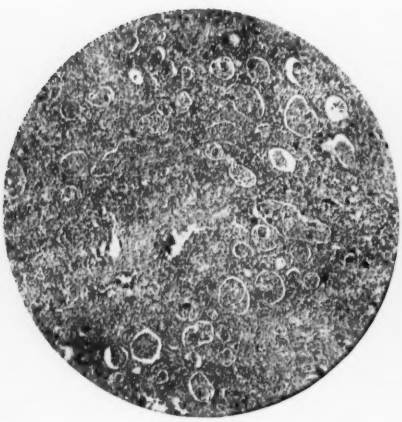

Fig. 3.—From Case 141 (14 in Syphilis Tables). Thymus: Shows fibrosis, increase of reticular cells, and granular degeneration with large size of the corpuscles of Hassal.

Fig. 4.—From Case 141 (14 in Syphilis Tables). Thymus: Shows granular degeneration and enlargement of the corpuscles of Hassal.

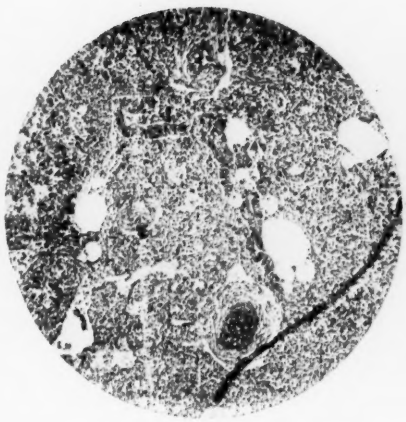

Fig. 5.—From Case 47 (3 in Syphilis Tables). Syphilitic lung: Interstitial pneumonia: Thickening of alveolar walls and of walls of blood vessels and bronchi, with catarrhal cells *loosely* filling alveoli. This lung contained numerous spirochætes.

Fig. 6.—From Case 47 (3 in Syphilis Tables). Syphilitic lung: Shows Interstitial pneumonia. Endothelial cells containing pigment, loosely filling alveoli, and similar large phagocytal cells in alveolar walls.

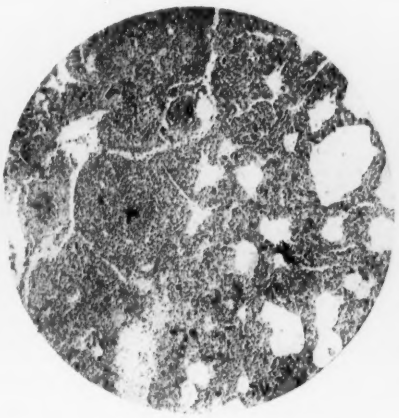

Fig. 7.—From Case 98 (7 in Syphilis Tables). Lung shows (1) thickening of alveolar walls and of the walls of two blood-vessels; (2) gumma, a little to left of centre of picture and marked x.

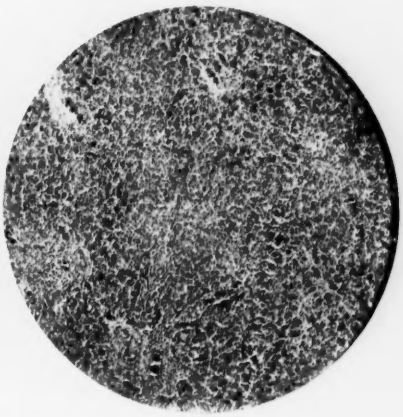

Fig. 8.—From Case 141 (14 in Syphilis Tables). Liver: Shows periportal and some fine cirrhosis, with atrophy of central zone of lobules.

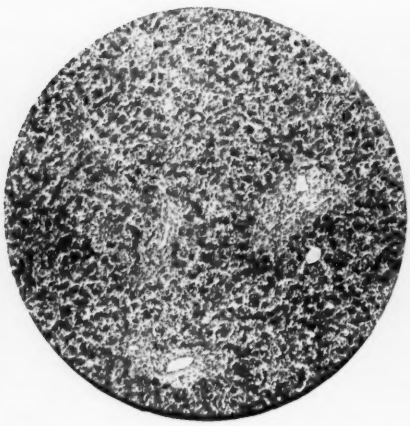

Fig. 9.—From Case 133 (12 in Syphilis Tables). Liver: Showing hæmopoiesis. Periportal cirrhosis with marked increase of lymphocytes in sinusoids.

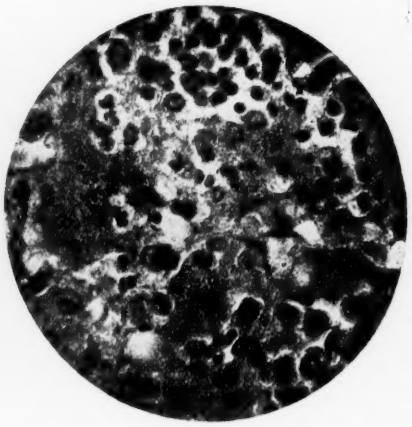

Fig. 10.—From Case 133 (12 in Syphilis Tables). Liver: Showing hæmopoiesis, large lymphocytes filling the sinusoids.

Fig. 11.—From Case 137 (13 in Syphilis Tables). Liver: Fine cirrhosis, with thickening of wall of hepatic veins in centre of lobules. A vein with thickened wall is seen at top of picture.

Fig. 12.—From Case 141 (14 in Syphilis Tables). Kidney infarction: shows (1) interstitial hæmorrhage in kidney; (2) thrombus in vein situated between cortex and pyramids (base of).

Fig. 13.—From Case 141 (14 in Syphilis Tables). Kidney: Shows necrotic glomerules and vessel (arteriole) in longitudinal section leading to it. The lumen of the vessel is obliterated by thickening of the intima. Note intertubular or interstitial hæmorrhage in lower portion of picture.

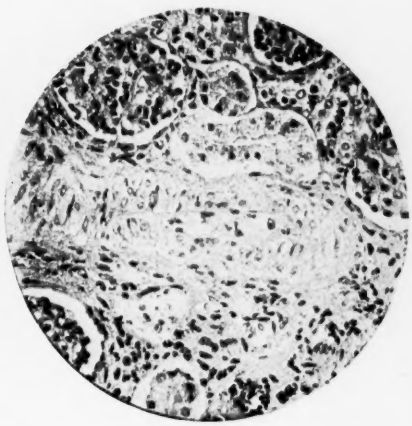

Fig. 14.—From Case 141 (14 in Syphilis Tables). Kidney: Shows arteriole in longitudinal section, with lumen almost obliterated by intimal thickening.

Fig. 15.—Drawing of kidney showing infarction. The hæmorrhage is strictly confined to the pyramids not extending into the cortex. Not all the pyramids are affected. The other kidney showed a similar appearance.

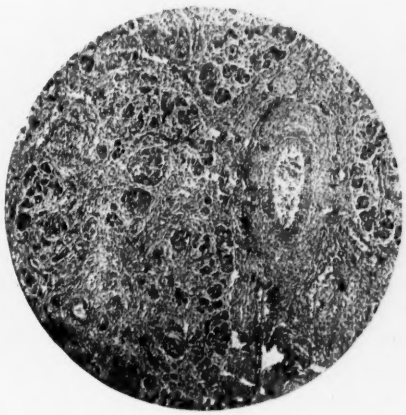

Fig. 16.—Pancreas: Showing fibrosis, thickening of vessel wall, and apparent increase in the numbers of the islands of Langerhans.

The Harlequin Fœtus.

By

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Having been so fortunate as to obtain two specimens of the Harlequin Fœtus we decided to examine each in detail. It is proposed to indicate the results of his investigation first; then to go into the matter of the family history, and, finally to review other published cases in order to trace any constant phenomena which might assist in the elucidation of an exciting cause.

Harlequin Fœtus I.

This child, a male, was admitted to King's College Hospital on the 28th of October, 1919. The labour had occurred at the eighth month and lasted twelve hours, the presentation being a breech. The fœtus survived its birth by only eight hours. Its appearance proved how appropriate are all the various names which have been applied to it—"armadillo," "coat of mail," "bark of tree," "tortoise." (Fig. 1.)

The skin was dry and harsh, the whole body being covered by numerous fissures running, for the most part, transversely and dividing the body into well-marked areas simulating a "loosely built wall," as Crocker so aptly puts it. These cracks averaged about 3 mm. in depth and 2 to 3 mm. in width; they were present in by far the greatest numbers in the vicinity of the joints. Their floor was covered by a thin translucent membrane, no raw surfaces being seen. The umbilical cord was normal. The hands and feet were curiously contracted, the former being in the position of acute palmar flexion; the latter assumed the appearance of exaggerated *pes cavus*, whilst the toes were stunted and poorly developed. The scrotum was thickened and empty, its raphe being prominent.

Both testicles were situated in the inguinal canal, presenting at the external abdominal ring. The penis was very small and was

overhung by a redundant prepuce. The scalp was bare, save for a few scattered hairs. The external ears were non-existent but for a few complicated fissures. The eyes could not be seen even on retraction of the lids, as the conjunctivæ were congested and very œdematous—the marked ectropion which was present doubtless having led to this. The lips were markedly thickened and everted, being drawn tightly over the jaws and showing the gums.

Fig. I.
Harlequin Fœtus I.

A careful dissection of the fœtus was carried out, the weights of the various organs being shown in Fig. ii. The anatomy proved

Organ.	Normal.*	Harlequin Fœtus I. ♂	Harlequin. Fœtus II. ♀
Brain	384·2 gms.	264 gms.	300 gms.
Liver	164 gms.	80·4 gms.	121·5 gms.
Right Lung	31·9 gms.	23·75 gms.	22 gms.
Left Lung	23·4 gms.	18·75 gms.	19·5 gms.
Thymus	8·15 gms. ♂	13·23 gms.	13· gms.
	10·85 gms. ♀		
Spleen	10·8 gms.	7·1 gms.	5 gms.
Thyroid...	4·85 gms. ♂		
	9·75 gms. ♀	0·3 gms.	0·75 gms.
Right Kidney	23·1 gms.	15·59 gms.	18·75 gms.
Left Kidney	23 gms.	15·875 gms.	18 gms.
Right Suprarenal ...	7·05 gms. ♂	9·1 gms.	4·5 gms.
Left Suprarenal ...	5·25 gms. ♀	9·3 gms.	3·75 gms.
Length of Fœtus ...	19½ ins.	17 ins.	19 ins.
Breadth across shoulders	4½ ins.	5 ins.	4¾ ins.
Weight	7lbs. 8ozs.	5lbs. 5¼ozs.	6lbs. 2ozs.

* Quoted from H. Vierordt. Daten v. Tabellen für Mediziner.

Fig. II.

Table of weights of organs of both Harlequins as contrasted with the normal.

to be practically normal. But the following points were particularly worthy of note. The thymus was by far the most conspicuous feature in the thorax, its distal portion conisting of two large lobes, overlapping the heart and lungs. Proximally it ascended into the neck on the left side of the trachea and œsophagus, ending in a pointed extremity posterior to the carotid sheath and at the level of the upper border of the thyroid cartilage. The relatively small size of the thyroid gland was the most noticeable feature, however. The heart was examined by Dr. R. J. Gladstone, at King's College Hospital, and was found to be normal. The middle lobe of the right lung showed some emphysema. There was slight dilatation of the pelvic colon. On removing the brain sub-tentorial hæmorrhages were seen on both sides, more marked on the left. The cranial nerves were all present and showed the usual distribution. The temporal bones were removed and were examined by Mr. Arthur Cheatle, who reported them to be normal. The eyes were situated far back in the orbits, the optic nerves being very short. They were examined by Mr. Vernon Cargill, who found no other anomaly. X-rays proved the osteology to be in no way exceptional. Histological preparations were made from the following organs: Thymus, thyroid, suprarenal, pituitary, testis, pancreas, spleen, kidney, prostate, cerebrum, medulla oblongata and lymphatic glands from various situations. These investigations proved

negative with the two following exceptions. The corpuscles of Hassal in the thymus were present in large numbers, being clearly marked and conveying the impression of activity. The histology of the thyroid was interesting in that although there were numerous vesicles filled with colloid, there were interspersed many small clumps of parenchymatous cells which had not yet taken on a glandular arrangement. The section of the skin is described below.

HARLEQUIN FŒTUS II.

The second fœtus, a female, was born on the 1st of October, 1920, at full-time and of the same parentage. The presentation was a breech and the diagnosis of a Harlequin was made by digital examination *per vaginam*. This child also survived its birth by only eight hours. Its general appearance was similar to that presented by the first fœtus, but rather more hair was present on the head (Fig. iii). The same dissections and corresponding

Fig. III.
Harlequin Fœtus II.

histological examinations were carried out. In this case the thymus presented the same appearance of activity. All other organs proved to be normal under the microscope, with the exception of the thyroid (Fig. iv).

Fig. IV.

Drawing of transverse section of the thyroid gland of Harlequin Fœtus II.

The normal glandular structure had almost entirely disappeared, the vesicles being merely vaguely outlined and indistinctly divided by the septa. The whole organ was very vascular. There seems to be a distinct increase in the amount of fibrous tissue present. Most striking is the fact that the whole of the section is seen to be permeated by round cells of varying sizes. That they are round cells and not endothelial cells cut transversely to their axes is proved by the complete absence of similar cells of oval or elongated outline. The colloid substance is entirely absent with the possible exception of a few scattered fragments. Microscopically, the ovary is normal.

The sections of the skin presented a similar appearance in each case.

HISTOLOGY OF THE SKIN (Fig. v).

The epidermis as a whole is enormously thickened, but the whole of the thickening is composed of horny layer. The epidermo-dermal line shows exaggerated papillary elevation and inter-

Fig. V.
Drawing of vertical section of the skin of Harlequin Fœtus.

papillary epidermal ridges. The former are dome-shaped at their apices and differ widely from the narrow-pointed papillæ found in ordinary ichthyosis. The latter are extremely narrow, in most cases with almost parallel sides.

The basal layer is abnormal in that the cells are mostly ovoid or cuboid in shape and the palisade arrangement is almost completely lost. In one section there are two small cavities in this layer, one containing four and the other two cells, which have no intercellular fibrillary connection.

The mucous layer is reduced in thickness and consists of four to five rows of rather small cells, showing the intercellular fibrillæ poorly or not at all and wanting the usual definite angular shape.

The granular layer is fairly well developed and does not

apparently show any deviation from the normal. It averages about three cells in thickness.

The horny layer is very complicated. It is enormously in excess of the normal, being in the proportion of about 14 to 1 of the combined mucous and basal layers. The section shows a somewhat broken surface to the horny layer, which itself shows many concentric whorls of cells, sometimes single and sometimes in groups of one or two. Where the follicles are cut in a direction approaching the vertical it may be seen that there is an enormous band of horny material lying between the hair and the external root sheath, but apparently not extending quite to the base of the follicle. In some cases one can trace clearly that the above whorls in the horny layer correspond to the follicles as they pass through it. Dr. Whitfield is of the opinion that most, if not all, of the whorls represent the follicles which are passing through the horny layer, and owing to its complexity have been cut in various directions. The horny cells appear to be normal in formation and have not retained their nuclei. In places there are small aggregations of leucocytes; but as these are found to be in the neighbourhood of the fissures between the horny plates, they are probably due merely to surface infection. The sweat channels are hyperkeratotic as they pass through the epidermis, but the intradermal portion of the ducts and the gland tubules proper do not deviate greatly, if at all, from the normal.

In the corium the collagenous bundles are rather fine, but perhaps not more so than in normal skin at this age. The elastic fibres are very fine and stain poorly. No elastic fibres could be traced into the papillæ. The whole corium shows some richness in connective-tissue cells with heavy protoplasmic bodies, but this is not so excessive for the age of the subject.

The hypoderm appears to be normal in thickness and structure.

Family History.

The parents were both of the age of 25 years in November 1919. The father is a well-built man and has no signs of disease. The mother is apparently healthy; it is noteworthy, however, that twelve hours after the birth of the second fœtus her pulse-rate was 65, her temperature 97·8° F. and her respirations 14. She had not lost blood, nor had the labour itself been severe. Her thyroid was not palpable. There were no obvious signs of thyroid insufficiency; but she is a well-nourished woman, with both skin and hair distinctly on the dry side.

Her first child was a male, born in November 1915. He is alive and healthy, a thin and active lad, with thick, dark-brown hair. His father states that he has occasional "swelling in the neck." On two occasions the child's thyroid was easily palpated, whilst on

a third it could not be felt at all. He reacts positively to both Loewis' and Porak's tests for hyperthyroidism.

Her second child was a female born in November 1918, who died, in Scotland, at the age of three months. The father's description is that the skin of this infant "was all drawn up like parchment." Her third and fourth pregnancies resulted in the production of the two Harlequins. There is no history of any miscarriages. The Wassermann reactions of the whole family were negative.

Discussion.

The condition was first described at the end of the eighteenth century and was called "cutis testacea" until Simpson suggested the name "ichthyosis intrauterina." Ballantyne has carefully investigated some forty-two cases. The family prevalence is marked and is associated with consanguinity though this is not the case in this instance.

The parents are generally free from all skin affections. Premature birth is common. The child is usually born alive, there being but one record of a still-born ichthyotic fœtus. Death is brought about indirectly by the associated deformities, *e.g.*, sepsis arising in the fissures, inability to suck, etc. Congestion and pulmonary œdema are sometimes found post-mortem. No abnormality has been observed in the mucous membranes, nor is there, apparently, any constant change in the internal organs.

Winfield reports a case in which the thyroid was absent; this is worthy of note as this gland in our first case was only about one-twelfth the normal weight, and in the second presented the abnormal histological changes described, as well as being considerably decreased in size. It may be mentioned that Anton Wassmuth recorded a case in which the parents were cretins.

All accounts mention the malformation of the external ear, but this loses its significance when it is considered that the complex development of this structure must be greatly affected by the hard and inelastic condition of the skin; even the eyelids and lips, which are, comparatively speaking, simple structures, show a certain degree of deformity consistent with their normal simplicity of contour.

As to the true nature of this condition, Barkow states that the first stage is a pemphigus; that the vesicles burst and the sites of rupture remain as fissures, the hyperkeratosis being then secondary. No evidence in favour of this hypothesis has ever been adduced by any other observers.

Ohmann-Dumesnil says that an arrest in the development of the hair and the sebaceous glands results in the epitrichium remaining

attached to the surface of the body, and that this stimulates the stratum corneum to excessive growth. Ballantyne suggests that their absence might well permit such a luxuriant hypertrophy. In any case, it is difficult to see why such a very thin layer of cells should remain uniformly attached over the whole of the body. In our cases, too, the hairs on the scalp were self-evident; whilst the skin of the head was in no place different from that covering the rest of the body. Further evidence against this view is provided by the fact that in Harlequin Fœtus II one fissure showed a terracing of the stratum corneum—thus proving that the cause must be continuously active. That more fissures do not show this condition is probably due to the fact that they have arisen round the joints as a result of fœtal movements. Such movements, too, would tend to disturb and detach any horny cells that are developed in the fissures subsequent to their first formation. In fact they might be described as cutaneous joints, and being joints, they are intolerant of anything which would tend to impede their ease of action. Maceration and loss of horny cells formed from the stratum granulosum therefore result.

Unna is of the opinion that it is a stagnatory tumour due to progressive disturbance of nutrition. The whole horny layer is excessively firm, and this allies it, he says, to a diffuse keratoma rather than to ichthyosis. In support of this he lays stress on the normal or excessive development of the sweat glands. In ichthyosis these are atrophied.

Hebra and Bland-Sutton maintain that it is a generalised seborrhœa; whilst Hartzell speaks about "somewhat greasy epidermic plates." Radcliffe Crocker uses the term "fatty" in this connection. Pringle states that the surface of the skin is smooth and studded with the dilated ducts of the sebaceous glands. Jacobi uses the term "seborrhœic plates." R. L. Sutton, however, states that both Hebra and Kaposi base their idea of a generalised seborrhœa on clinical grounds only, and not on histological evidence. As a matter of fact, even less fat is present in the stratum corneum than normally. Osmic acid shows the presence of but a very few thin black lines. No observer has ever found the sebaceous glands to be abnormally increased in number.

With regard to the sweat glands, both Unna and Kyber found them to be numerically excessive. On the other hand, Radcliffe Crocker, Caspary, and Ballantyne all held the opposite view; the latter even states that the hyperkeratosis leads to atrophy, both of the hair and of the sebaceous and coil glands.

Crocker, Chambard and Caspary all believe the condition to be ichthyosis, although Norman Walker holds the divergent view, in that this is congenital whilst ichthyosis appears towards the end of

the first year of life. Pringle, in Allbutt and Rolleston's *System of Medicine,* states that a few mild cases have survived and have later undergone such changes as to convert them into an ordinary ichthyosis. There are on record a few cases in which the infant is covered at birth with a few flakes of collodion-like substance, which later desquamates. Sometimes this mild form develops soon after birth, whilst true ichthyosis most commonly becomes evident about the age of one year. Both Pringle and Radcliffe Crocker state that the conditions are identical histologically.

Beyond the fact that the phenomenon depends on an error of development, nothing is known as to its pathogenesis. But there are a few facts that seem to warrant the tentative suggestion that it is is some way connected with the metabolism of the thyroid gland.

It is not an epiblastic aberration. Although the whole of the epidermis shows histological changes it is only the stratum corneum which is profoundly affected; not only is it profoundly affected, but it shows the same microscopic appearances over the whole of the body. Did the fault lie with the epiblast this universality would not occur. In different parts of the body various epidermal layers would be affected in different degrees. A still more cogent argument is to be found in the fact that the nervous system, also an epiblastic structure, proved to be normal.

Mechanical factors suffice to explain the maldevelopment of the ear, etc. Although the external ear is developed from the first cleft, neither the mandible nor salivary glands, which grow from the first recess, show concurrent abnormality. From the third recess is developed the thymus, which is approximately normal in size. The thyroid is from the fourth recess and is ill-developed. Beyond the variations in size, there is nothing to warrant the assertion that either the epiblast or the hypoblast is at fault.

Again, it is very difficult to see why the familial character of the cases should be so evident if the epiblast should always become aberrant in one direction in repeated pregnancies. Cases of anencephaly, agnathia and cyclopia never show such a familial incidence. Yet these are essentially cases of maldevelopment. The supposition that the stratum corneum only is constantly and similarly affected whilst the other epiblastic structures are constantly normal in repeated pregnancies, is surely untenable. We are therefore forced to look outside the ovum for the cause.

THE THYROID GLAND.

Not only does the embryo *in utero* receive nutrition direct, via the maternal blood, but the more subtle hormones, vitamines, etc., must play their part.

The anatomical and histological changes found in the thyroid glands in these infants, naturally directed our attention to the question of thyroid metabolism.

The striking changes occurring in the skin in myxœdema implies that iodothyrin plays an important part in the regulation of its nutrition. Byrom Bramwell therefore employed thyroid extract in various dermatoses and obtained his best results in psoriasis and ichythosis. That the halogens are intimately connected with the metabolism of this structure is seen by the fact that, although innumerable drugs may give rise to various erythemata, iodides and bromides alone, if we except chronic arsenical changes, produce distinct lesions. Even when pustules appear the pus in them is sterile until secondary infection occurs. Cases have been recorded in which the mother was taking bromides during her pregnancy, with the result that the child at birth showed an extensive and characteristic bromide eruption.

"We have no reason to suppose that the fœtal endocrine organs function efficiently before birth." Biedl definitely states this fact in the case of the thymus, whilst McCarrison makes a similar assertion with regard to the thyroid. But he further states that the developing gland is particularly susceptible to influences which damage the mother's thyroid. That the maternal gland can influence that of the infant is proved by the experiments quoted by Rendle Short; in these, partial thyroidectomies performed upon pregnant bitches resulted in the presence of goitres in the puppies which were subsequently born.

There are yet two other facts of interest in this condition. During pregnancy the maternal gland undergoes a physiological hypertrophy which lasts until suckling is finished. Also, Langdon Brown states that "an infant may develope thyroidism if the mother is taking thyroid extract, so that the drug evidently passes into the milk with ease. The greater responsiveness of the female thyroid to nutritional, psychic or toxic strain may be a pathological exaggeration of a mechanism designed for the benefit of the next generation. The liability of women to myxœdema about the time of the climacteric is capable of a similar interpretation. In men, neither Graves' disease nor myxœdema shows a striking age incidence."

The experiments quoted by Rendle Short prove that the maternal thyroid *can* influence an infantile gland. They rather hint at the fact that a mother suffering from hypothyroidism most frequently gives birth to a hyperthyroid child. That this is possible is proved by the following cases:—

(1) Mrs. M. A. has been "ailing" for the past twenty-five years. She is to-day a typical case of myxœdema, although she has been kept going on thyroid extract during the last decade.

Her eldest child, æt. 27, is perfectly normal. A girl, aged 19, and a boy, aged 13, however, both show definite hyperthroidism—fine tremors, slight tachycardia, anæmia, emaciation, perspirations and flushes are present.

(2) Mrs. B., æt. 43, an early case of myxœdema, of whom the youngest child only, aged 4, shows any abnormality. This child has a definite goitre, exophthalmos, tachycardia, tremor, etc.

It seems, therefore, that there may be a balance between maternal and fœtal endocrine organs. Should the former be abnormal, the latter so adjust themselves as to endeavour to maintain this balance. In such circumstances it may be that the fœtal gland becomes active.

But the matter is not so absolutely simple as this. The child born of such a mother often shows no detectable abnormality, and some even show a hypothyroidism. This could only be expected as Nature does not work in pursuance of a mathematical problem. Yet the balance of evidence certainly seems to be in favour of such interdependent relationship between the maternal and fœtal ductless glands.

HYPOTHESIS.

These facts have suggested the hypothesis that congenital ichthyosis is dependant upon a deficiency in maternal iodothyrin concurrent with a similar fœtal condition; that ordinary ichthyosis is one special symptom of a hypothyroidism in the child. Let us investigate these statements.

Suppose a woman with hyperthyroidism be pregnant; the child at birth will not show any ichthyotic changes; whilst it is at the breast the same will hold true. What happens after this depends solely upon the condition of the child's thyroid; if it be decreased in function (as is quite possible from the close and intimate relations between mother and child, in that a maternal hyperthyroidism resulting in fœtal hypothyroidism is only a corollary of the above cases), then when the child no longer benefits from its mother's secretion its hypothyroidism becomes evident, and this will occur about the end of the first year, *i.e.*, shortly after the child has been weaned. That this is possible is shown by the following case:—

Mrs. G. is herself a typical case of Graves' disease. Her children, however, aged 8, 6, and $2\frac{1}{2}$ years, all show ichthyosis, and "all started soon after weaning." This last statement was volunteered by the mother herself.

At puberty, when the thyroid begins to hypertrophy, the symptoms (ichthyosis) will improve. This is clinically a fact. A structure so damaged as the skin then is, cannot be expected to recover completely even if the thyroid does approach the normal in

degree of activity. This is only a parallel to rickets. Rickets is a disease of the "growing years." Deficiency of fat soluble A, in the diet of a grown man does not produce such signs and symptoms as it would in the case of a child, aged two. Yet the results of active rickets during childhood can be detected in later life.

Suppose the mother to be normal, then the child will most probably be normal unless by mischance there happens to be some congenital accident to its thyroid. But even if this should occur symptoms in the child would not appear until after weaning. To this class belong the cretins born of normal parents.

Should the mother tend towards hypothyroidism then the infant will most probably show hyper-secretion of the gland. But there is the possibility that it, too, might show deficient activity of the thyroid owing to a congenital "accident" to this structure. Then we should expect the child to show ichthyosis at birth. Not only are such accidents comparatively rare among all children, but their incidence among those born of a hypothyroid mother is still less, in that the number of such mothers is less than the number of normal mothers. This accounts for the rarity of the condition. This possibility is shown by the cases quoted by Wassmuth, in which the parents were cretins. It is also strongly suggested by the appearance of the mother of these two harlequins.

To recapitulate— it is suggested that in (1) ordinary ichthyosis, and in (2) Harlequin Fœtus, there is deficient or defective thyroid *in the infant.* In (1) this is made up by the thyroid secretion of the mother, and, therefore, no symptoms appear until after weaning. In (2) the mother is unable to supply thyroid secretion, and so the child *in utero* develops an exaggerated ichthyosis.

Unfortunately, direct evidence along these lines is difficult of access, in that the absence of the physiological hypertrophy of the thyroid during pregnancy may result in a comparative maternal hypothyroidism. Then the mother may show none of the more obvious signs of this condition. Also the difficulty in the diagnosis of early cases of abnormal thyroid metabolism is obviously great.

Kendall's experiments proving the existence of two isomers of iodothyrin, each with different physiological actions may solve the riddle. Indeed it is essential to the maintenance of this hypothesis that such should be the case, for none of the classical signs of cretinism are seen in ichthyotic children. The question of isomerism might also explain the fact that many ichthyotics do not improve on thyroid extract. The effect of the drying of the gland, etc., in the preparation of this drug, might well destroy or cause re-arrangement of the more unstable isomer.

Evidence that the *initial* deficiency of thyroidism in the *infant* is due to maternal causes in these cases cannot be adduced. It may

be that the isomer affecting the skin cannot be metabolised during pregnancy in some cases; then the fœtal organ is deprived of the spark to light its own fires. Or else there is a congenital dysmetabolism. This may be the result either of a maternal hyperthyroidism, or possibly it may be an actual familial metabolic feature such as is seen in cystinuria.

Further investigations are being carried out. It is proposed to calculate the rate of maternal metabolism by the respiratory interchange method. Later we propose to feed the mother on thyroid extract, etc.

Conclusions.

(*a*) The Harlequin Fœtus is more closely allied to ichthyosis than to any other known condition.

(*b*) Histologically the two differ only in the relative width of the papillæ and interpapillary ridges.

(*c*) The difference in the age incidence of the two is one of degree only and not of kind.

(*d*) It is the result of maternal hypothyroidism coincident with an anomaly of the fœtal thyroid gland resulting in a decrease in its degree of activity.

(*e*) The explanation why this condition and true ichthyosis differ from cretinism lies in the existence of two isomers of thyroiodin.

In conclusion, we desire to express our thanks to all those who have rendered us assistance, and in this connection especial gratitude is due to Dr. Arthur Whitfield, for his help in elucidating the histological appearances of the skin.

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On the Pseudomyxoma Peritonei.

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In 1884, Werth, in his classic paper, described the condition to which he gave the name of pseudomyxoma peritonei. This disease is due to the flooding of the abdominal cavity with masses of gelatinous matter—due to the rupture of a pseudomucinous ovarian cystoma, or to the bursting of the appendix vermicularis, when too much expanded by its mucous contents. Many years elapsed before E. Fränkel (1901) reported a second case confirming the possibility of this disease.

From this time began the differentiation of the two varieties of pseudomyxoma peritonei, according to its origin from an ovarian cystoma or from the appendix. The first variety was much earlier made a subject of more exact study, and many treatises were written dealing with its etiology, method of spreading, clinical symptoms, microscopical structure and malignancy, etc.

In addition to the treatises dealing with this question and usually cited, I should like to mention one other, which is very seldom referred to even by Russian authors, namely the dissertation by Dr. T. D. Eiger, entitled "Materials dealing with the subject of Pseudomyxoma Peritonei," which appeared in 1900 from the Clinic of Prof. A. T. Lebedeff. This paper contained much detailed historical and literary matter, and described three cases treated at the said Clinic.

The conclusions reached by the author as a result of his investigations may be briefly summarised as follows:—(*a*) Pseudomyxoma peritonei is not an independent disease, but always appears as a consequence of the bursting of pseudomucinous ovarian tumours;

1. Professor Krivsky, who was a member of the Russian Commission in London during the first years of the war, returned at once to Russia on the outbreak of the Revolution, and has not been heard of since. The Editor has therefore been unable to send a proof of this paper, which was in script, to Professor Krivsky, and although great care has been taken with the paper in preparing it for press it is possible that some portions of it are not quite clear.

(*b*) there are typical adenocystomata which show the peculiarity that their walls are very thin and therefore burst very easily; (*c*) the contents of the various loculi in adenocystomata are not identical, the secretion in the larger and older cavities being of a watery nature, while in the smaller and younger ones it is gelatinous; (*d*) the flooding of the abdominal cavity with the contents of the cystoma does not cause myxomatous degeneration of the peritoneum; an alteration ensues, viz., the formation of new blood-vessels, first in the peritoneum and later in the pseudomucinous masses, which later become divided into compartments and finally disappear.

Collateral with the foregoing process the so-called "implantation" may appear. This is characterised by the appearance on the peritoneum of secondary cystomata, due to the grafting on it of some of the living elements of the primary cystoma. These secondary cystomata produce in their turn pseudomucinous masses. The fact that in some cases the change in the peritoneum is exclusively characterized by chronic inflammation, while in others it is complicated by implantation is explained by the age of the ruptured cystoma. If it is of considerable age and the contents are probably without living epithelial elements, only the reactive inflammation appears on the peritoneum; if, on the other hand, it is of recent formation and elements capable of further growth escape into the peritoneal cavity, the process of inflammation is complicated by implantation. The only correct treatment of this disease is the removal of the ruptured cystoma by surgical operation and of the colloid matter which had escaped from it into the peritoneum. In a number of recorded cases, after the operation the patches of gelatinous matter implanted on the peritoneum, instead of disappearing, continued to spread, thus causing a relapse and necessitating a second operation. The transition of the implanted masses to the atypical neoplasm is quite possible, but it very seldom occurs.

Although I have no intention of dwelling at any great length upon matters which might have a tendency to influence the views held during a period of 14 years, I may add that a year after the publication of Eiger's paper the investigations of E. Fränkel resulted in the discovery of a new variety of the disease under discussion.

As shown by Paczek, Henke[1] anticipated Fränkel by describing a case of multiple cystic tumour in the peritoneal cavity, similar to a lymphangeioma, "microscopically the changes in the peritoneum reminded one of the so-called pseudomyxoma peritonei of Worth,

1. See Paczek, *l.c.*, p.g.

but as in our case the patient was a man this was not possible. Evidently this was a case of pseudomyxoma peritonei arising in the vermiform appendix."

Following Fränkel's paper appeared others, which confirmed his observations, and cases of this new variety, viz., pseudomyxoma peritonei due to a ruptured vermiform appendix, can now be counted in tens; thus B. M. Leontieff (1913) reports 22 cases, Winteller (1909) 12, Paczek (1912) 9. In my own opinion we must add to the 22 cases of Leontieff those described by the following authorities, viz.: Christian, Trotte, Meriel et Daunic, Rothe, Wilson (two cases), Eden, Paczek, Cagnetto,[1] and my own, which bring the total up to 32.

Bailey (1916) states that no less than one hundred cases of pseudomyxoma peritonei arising from the appendix have been noted, and cites his own case and those of Castle, Bhanoster, and G. Lewis. In the same paper he mentions another case of his own which we wish to cite later on.

It has been proved that this disease occurs in men even more frequently than in women, for, of the nine cases cited by Paczek, only two were in women.

The discovery of the formation and accumulation of mucus in the appendix in such quantities as to rupture the latter and escape into the peritoneal cavity led pathologists and surgeons to inquire into the causes of the accumulation of the mucus. Papers appeared discussing the conditions of its formation, and a number of investigators undertook macro- and microscopic examinations of the appendix. A little later appeared detailed accounts of these microscopic researches, especially with reference to cysts on the appendix, diverticuli, etc. (see E. N. Vinteller, T. T. Syssoyeff, G. N. Orloff, W. Simon, M. Zondeck, Oberndorfer and others).

Of late authorities on the subject seem gradually to be coming to the conclusion, correctly we think, that the disease has in many cases originated in both organs, *i.e.*, in ovary and appendix, as in the one we cite below, the only doubt being which organ was first attacked. If we admit the discovery in late years of cases of this disease having their origin in the appendix, it may be supposed that there were such cases earlier, but that the changes in the appendix were not noticed, being obscured by the changes which had taken place in other abdominal organs by the deposition of the mucus in various parts of the abdominal cavity.

The patient, Elisabeth R., a married woman, was admitted to the Obukhow Hospital on the 15th October, 1913. She was then 37 years of age, had been 10 years married, but had never been

1. See Paczek, *l.c.*, p. 9, *et seq.*

pregnant; menstruation began at the age of 14 years, and occurred regularly every month for four days, up to the 26th September, 1913, and then ceased. She stated that she had been ill for some six months, and was an in-patient of one of the hospitals in Petrograd from September 13th till the 2nd or 3rd of October; she was there treated for swelling of the abdomen and chronic diarrhœa, which complaint she had been free from during the three weeks prior to her admission to the Obukrov Hospital. On admission her temperature was 97·4° F., and the pulse-rate 120; the heart was a little wider than normal, but the beating was distinct; there was evident ascites, and the feet were swollen; the weight of body was slightly under 6 stone.

The abdomen was much distended with ascites, and the abdominal organs were not to be felt. The circumference of the abdomen, measured at the level of the navel, was 82 cm., there was no œdema and defæcation was normal; temperature 97·9° F.

The daily condition of the patient subsequent to this second examination may be briefly summarized as follows:—

16 October: T. 97·7° F., p. 96; defæcation once, action formed, normal in appearance; the quantity of urine 500 cc., with a specific gravity of 1023, and no albumen or sugar; in the evening T. 96·8° F.

17 October: T. 97·5° F.; the previous evening the patient had a slight attack of diarrhœa with pain, which ceased later on and she felt better; in the evening T. 98·4° F.

18 October: T. 97·7° F. in the morning; defæcation twice, motion porridge-like.

19 October: T. 97·9° F. in the morning, 96·8° F. in the evening; circumference of the abdomen 81 cm., diuresis normal; defæcation twice, motion formed, no cough.

20 October: T. 97·7° F. and 96·8° F., pulse 86; diaphragm forced upward; ascites marked.

22 October: The temperature the same; ascites undiminished; the circumference of the abdomen 82 cm. On tapping the abdomen only a few drops of thick sticky fluid were drawn off. The patient was transferred to the gynæcological department.

The circumference of the abdomen at the level of the navel was 81 cm. (ascites), no discharge from the vagina, the cervix uteri is closed, the uterus is anteflexed, the fornices stretched and not tender. Through the left anterior fornix high up there was an elastic tumour very difficult to reach; a more detailed examination was impossible owing to the ascites; T. 98·4° F.

Some days passed without any change; the temperature was normal, but the patient complained of difficulty in breathing in consequence of increasing ascites.

On the 30th October, 1913, the abdomen was opened in the

middle line under mixed narcosis (ether 80·0, chloroform 8·; duration of the narcosis 1 hour 20 minutes). On opening the peritoneal cavity lumps of gelatinous matter began at once to escape. These amorphous lumps of jelly were larger than the palm of the hand and shaped like a jelly-fish, being transparent at the periphery and muddy in the centre; they were lying freely between the intestines and were not without difficulty removed from the peritoneal cavity. The peritoneum of the intestines and of the abdominal wall was a little injected, but there was no sign anywhere that the above-mentioned gelatinous matter was adherent to it.

There was a thin multilocular cystoma of the left ovary, about the size of the head of a new-born child, containing gelatinous matter similar to the lumps in the peritoneal cavity. There were no adhesions. Owing to the bursting of the wall of the cystoma in several places the gelatinous matter had exuded and adhered to its surface. On the upper surface of the cystoma lay the salpinx, very much enlarged and thickened, but in other respects normally developed. The pedicle of the cystoma was tied and the latter removed, together with the left tube, after which the stump was sewn over. The right appendages, although of normal size, were also cut away.

When removing the lumps of gelatinous matter from the pouch of Douglas and from between the intestines special examination was made of the peritoneum with a view to ascertaining to what extent they had spread in it, but, as already mentioned, no sign of such was discovered. Particular attention was paid to the appendix, which appeared to have undergone considerable change; it was much thickened and of oval shape, resembling somewhat a large plum; it was not adherent to any other part and projected into the peritoneal cavity. The removal of the mucus adhering to it led to the discovery of three punctures, which, as well as its cavity, were filled with mucus similar to that above mentioned. These punctures, the edges of which were thickened and transparent, were about $\frac{3}{4}$ cm. in diameter, and situated close to one another about midway between the two ends of the appendix. The latter was removed in the usual manner; it contained no excrement, and no changes were observed in the mesentery.

The abdominal cavity was with some difficulty cleansed of the foreign gelatinous masses, which, when collected, were found to have a bulk of no less than 3,500 cc.

The uterus retained its normal shape. The abdominal wall was sewn up as usual in three layers.

The appendix measured 6·5 cm. in length, 3 cm. in breadth and more than 2 cm. in thickness of wall; it was filled with mucus, but

contained no excrement; the cavity was evidently closed at the part nearest to the cæcum.

Recovery was normal, and 27 days after the operation the patient left the Hospital suffering only from very slight ascites.

In May 1914 the patient, who had visibly improved in health, stated that she felt well and had no cause for complaint. On examination *per vaginam*, a small thickening on the right of the uterus was discovered, which was suspicious from the point of view of recurrence.

Fourteen months after the operation I saw the patient, who complained only of severe headaches during menstruation, which was quite regular in spite of the absence of the ovaries. The scar caused by the operation was in a perfectly healthy condition, and there was no sign of tumour or ascites in the abdominal cavity. An examination *per vaginam* proved the uterus to be in a normal position, but it seemed a little enlarged. In the right posterior fornix there was a very small thickening of the utero-sacral ligament which limited the mobility of the uterus; this was probably due to adhesions. On the left side, in the region of the stump of the left appendages, there was also a thickening smaller than on the right side, movable and painless.

The gelatinous lumps, which were lying unattached in the peritoneal cavity, were not examined microscopically, and it is impossible to state whether they contained any epithelial matter.

On examination of sections of the ovarian cyst the cylindrical epithelium was distinctly noted to be well preserved, with here and there goblet cells, producing mucus, which lay adjacent to them in large quantities. The epithelium was in places detached, partly retaining its normal shape, partly degenerated and with picuetic appearance in the nucleus; further, there was to be seen the stroma of the connective-tissue, infiltrated with lymphocytes and polyblasts which were chiefly on the periphery of the vessels, the endothelium of which appeared to be swollen. Isolated formed elements occurred even at some distance from the vessels between the collagenous fibres; between the fibres of the connective-tissue were dispersed elements of muscle tissue in small quantities, while fibroblasts were few in number; here and there swelling, even hyalinization, of the walls of the vessels was noted.

Pieces were taken from the appendix in two places; firstly, from the distal end, which was distended and had not undergone much change; and, secondly, from the callous edge of one of the openings.

In the first named the epithelium was in parts in a state of some preservation, here and there it was cylindrical, or quite absent, being exfoliated to a great extent; the submucous layer was

characterized by an accumulation of lymphocytes, somewhat diffuse and sometimes in the shape of small follicles with rather limited contours; further, there was a layer of thick connective-tissue, poor in fibroblasts, and under this the muscle layer, here and there replaced by the elements of new connective-tissue, rich in cellular forms; there was no sign of Lieberkühn's glands, but there was a profusion of blood-vessels, the walls of which were thickened, and here and there, as in the stroma of connective-tissue, were places with hyalin change. The endothelium of the vessels was swollen.

Both in the mucus between the connective- and muscle-tissues and in the thickened serosa were discovered precipitations of lime, but not in any large quantities.

For the purpose of staining the hæmatoxylin eosin, Van Giesson, Giemra[1] was employed, and for determination of the mucus the micro-chemical reaction with the mucicarmin stain[2] was employed, with positive result, showing the gelatinous substance in dark pink colour.

The point we hoped to settle by the microscopical examination, whether the disease of the appendix began on the outside and proceeded inwards, or whether the mucus with which it was filled perforated the walls of the appendix, was not definitely decided; but from a theoretical point of view the first hypothesis is very difficult to admit. Therefore we had in our case a pseudomucinous cystoma of the left ovary, the wall of which was very thin and was broken and then a mass consisting of the separated parts of the cystoma forced its way into the cavity of the peritoneum spreading freely between the intestines and little by little filling the whole cavity—the quantity without counting the loss was no less than 3,300 cc.—clinically it gave the impression of acute ascites, causing suffering to the patient and compelling her at last to seek medical advice.

When the wall of the cystoma was ruptured we could not determine, but it was certainly not less than six months previously, because the patient at that time noticed the swelling of the abdomen; whether it took place suddenly or gradually it is also impossible to ascertain, for the patient did not remember anything happening to her which could be attributed to the rupture of the wall of the cystoma.

What was the reaction of the peritoneum of the abdominal wall and of the intestines to the gelatinous matter which had escaped into the abdomen?

1. 20 cc. of mixture of azur 2 (water solution in 1 :1000) and eosin W.G. (water sol. 1 :1000) in 80 cc. of water.

2. Spirituous solution for 15—30 minutes, before that hæmatoxylin heyer for 10 minutes

As was seen at the operation, it consisted simply in the enlargement of the blood-vessels of the peritoneum, *i.e.*, hyperæmia, but we did not find on the latter any places where the gelatinous mass was adherent and had continued to develop.

Unfortunately the unattached gelatinous masses were not microscopically examined, and therefore it is impossible to decide definitely whether they were inclined to organization; it may, however, be fairly presumed this was so, for in the centre of these almost entirely transparent masses, there were to be seen with the naked eye, whitish cloudy spots with remarkable little fibres spreading out in all directions.

These masses were nowhere adherent to the peritoneum.

After the diagnosis of the pseudomyxoma of peritoneum particular attention was given to the condition of the appendix, and though it was definitely settled that these gelatinous masses had their origin in the cystoma of the left ovary, yet the appendix appeared to have taken part in the process and was changed as previously described.

Thus in this case we have two distinct causes of pseudomyxoma peritonei—(*a*) the burst wall of the cystoma of the left ovary; and (*b*) the appendix, which latter represented a cyst-like formation, filled with mucus which escaped into the peritoneal cavity through the three perforations already mentioned.

The question naturally arises as to which was the seat of the primary affection, the cystoma or the appendix, and this question we shall now deal with.

In the first place, the number and bulk of the floating masses which escaped into the peritoneal cavity cannot determine their origin, for it is known that in the case of pseudomyxoma peritonei, having its origin in the appendix, the quantity of mucus can also be very large. Even the microscopical examination of the mucus would hardly allow of a definite diagnosis, for in both forms of pseudomyxoma the epithelium must be cylindrical in shape or depressed into a cubic form with a number—larger or smaller as the case may be—of the goblet-like cells producing mucus.

In the second place, if the primary process was in the appendix it would be more likely to affect the right ovary and not the left one as in the case in point.

Then again, from enquiries made of the patient, we know that the swelling of the abdomen started about six months before she came to the hospital, while it was not till later that she suffered from almost continuous diarrhœa, which ceased only three weeks before her arrival at our Hospital. These symptoms, in our opinion, are explained by the supposition that the gelatinous masses had been collecting in the peritoneal cavity for a long time, that is,

prior to six months preceding the operation (during which time the abdomen was swelling), and then the process was either localized or, anticipating our conclusions, we may say that it began to form independently in the appendix and was accompanied with diarrhœa.

Although the microscopical changes in the appendix do not give support to any theory relative to whether the disease started on the outside wall and proceeded inwards, or *vice versa*, the second theory seems more logical and truer in a pathological sense, because otherwise it would have to be presumed that the gelatinous masses, not being adherent to the peritoneum anywhere else save the appendix, could obtain corroding or even perforating power sufficient to pierce the wall of the appendix; this we do not find anywhere in descriptions of similar cases.

Taking all this into consideration, we think that the appendix cannot be considered the point of origin of the disease because it was attacked after the cyst of the ovary appeared; further, it cannot be supposed that the appendix was attacked secondarily by means of the protruding action of the gelatinous masses, for if this were so it would have to be presumed that these masses could perforate the walls of the appendix.

The two possibilities which remain, therefore, are either that both in the cyst of the ovary and in the vermiform appendix changes identical in character took place simultaneously, and a retentive pseudomyxomatous cyst was formed in the latter, or the primary seat of the disease was the cyst of the left ovary, which, bursting, led to general peritoneal dissemination. This gave rise to secondary, possibly inflammatory, changes in the region of the appendix, causing a cyst, filled with mucus, which in time perforated its walls.

This last theory would seem to be corroborated by the literature extant dealing with pseudomyxoma of the peritoneum arising in the appendix and the origin of cysts in the latter (Oberndorfer, Vonheler, Ssyboieff, etc.). We know, on the authority of these authors that changes in the appendix produced by inflammation may cause cystic or similar growths.

In support of the theory of a simultaneous process of disease going on in the two organs it may be advanced that this theory is in no way nullified by the preceding one, and it does not exclude the idea of the absence of these diseases in the appendix. Moreover, it may also be presumed that the disease in the latter organ began to develop at the same time as in the cyst of the ovary, but progressed imperceptibly, and finally marked its appearance by diarrhœa.

The latter was caused, as we suppose, by the escape of the mucus from the appendix into the intestine before it had become isolated from the cæcum.

In view of the foregoing we come to the conclusion that the process in the cyst of the ovary and in the appendix were of identical origin and began to develop almost, if not quite, simultaneously.

Researches into the literature of the subject confirmed in the main the correctness of our views.

Certain indications were, however, discovered which might easily have led us astray, and with these we shall deal in greater detail later. Some cases were described of psudomyxoma peritonei arising in the appendix, which proved that men also were subject to the disease and that it was not necessarily the outcome of a cystoma of the ovary. This led to further investigations into the cause of cysts in the appendix, and more attention was given to this latter organ, and cases were instanced in which the disease was present in the cystoma of the ovary and the appendix simultaneously.

As one instance of this we may mention the following cases treated by Rathe:—A woman, 41 years of age, who had given birth to nine children, was diagnosed as suffering from a cyst of the left ovary. She was operated upon in November 1909, when cysts as large as a man's head were discovered in both ovaries, the abdominal cavity being flooded with gelatinous masses; the cysts were removed. In March 1912 a knotty growth about the size of a hen's egg was observed on the scar of the abdominal wall; it was of gelatinous formation and protruded from the scar into the peritoneal cavity; this growth was acknowledged (by Bondy) after microscopical examination to be a case of pseudomyxoma. No further growths of a similar nature were found in the peritoneal cavity. A third operation, which was performed on October 23rd, 1912, gave no sign either of ascites or free gelatinous masses. There were, however, a number of tumours on the peritoneum of the bladder, the small intestine, the omentum, and largest of all—about the size of a pigeon's egg—on the ovarian pedicles. Very decided changes were also observed in the appendix. All these growths upon microscopical examination proved to be pseudomyxomatous in structure.

When Rathe demonstrated this case Bondy suggested that the pseudomyxoma ovarii et peritonei might have been caused by the accumulation of the mucus in the appendix, and he advised attention being paid to this organ.

On the occasion of the second demonstration of his case by Rathe, Bondy considered it imperative once more to state his opinion, and in support of it he adduced one case of pseudomyxoma peritonei with a large cyst of one ovary and smaller one of the

other, in which he had examined the appendix and found there changes corresponding to those in the ovaries.

A similar view was also taken by R. Meyer with reference to a case which was demonstrated by W. Nagel (*Zentr. f. Gynæk.*, 1912, p. 1,583). Mayer raised the point as to whether in this case of pseudomyxoma peritonei it was possible to exclude the idea of the appendix being the primary seat of the disease since the gelatinous tumours of the ovaries seemed to be but secondary causes.

Rathe, in citing this opinion of R. Meyer, thought it necessary to dissent from it as unproved. He admitted there were many authorities who considered the appendix to be the organ primarily attacked, but his own opinion was that it was the ovary, and that the appendix was only a secondary seat of the disease.

This new demonstration of Rathe's case provoked very animated discussion.

Biermer, in whose department the case of Rathe's occurred, asserted that there was no other metastasis than to the wall of the abdomen, and that, although the appendix was not intentionally overlooked, it did not attract particular attention, and he consequently could imagine that there was no change in it.

Peiser also expressed the opinion that the ovary was first attacked and the appendix subsequently.

On the other hand, L. Fränkel, Klaatrch, Asch and Bondy took a contrary view and considered it highly improbable that the wall of the appendix was perforated from without by the myxoma, as would have been necessary in order to prove the metastasis of the disease from the ovary.

Whether the appendix was in this case the primary seat of the disease could not therefore, owing to difference of opinion, be definitely determined.

The idea that the issue of the disease was more favourable when arising in the appendix than in the cystoma of the ovary, was supported by the fact that after the removal of the primary seat of the disease (*i.e.*, the appendix) the patients were less liable to relapse than if the metastatic tumours of the ovary were removed and the appendix—the supposed but not proved primary seat of the disease—retained.

In all future cases in which an operation is performed a detailed examination of the appendix should on no account be omitted, as it may be the primary seat of the disease.

Bondy goes still further in his suppositions, based upon this case of his, and even advances the hypothesis that every case of pseudomyxoma peritonei, originated in the appendix, the ovaries and peritoneum being but secondary seats of the disease.

This hypothesis seems to us, however, an untenable one, being

the result of a too audacious generalizing based upon isolated cases.

Our previously mentioned conviction that, in our own case, the disease had two distinct and simultaneous places of origin was confirmed by some new facts, which we should like to cite.

T. W. Eden has described a case upon which he operated resembling Rathe's and our own. This case was interesting because when the ovary was first attacked changes occurred in the appendix, quite independent of the ovary, similar to those observed in several cases of pseudomyxoma arising in this organ.

This case was more allied to Rathe's than to our own, in which at the first operation, changes were noted to have taken place in both organs. The patient, a woman, 46 years of age, was operated upon for cystoma of the right ovary. The operation discovered, besides the cystoma, a large quantity of clear yellow jelly in the peritoneal cavity which it was found impossible to remove entirely owing to its firm adhesion. The uterus and the left appendages appeared to be normal, but no special attention was paid to the appendix. Within two years and four months after the operation the abdomen began to enlarge, and a second operation was performed. This discovered a cystoma of the left ovary, similar in character to that removed from the right ovary, which had burst and filled the entire abdominal cavity with colloid matter. The peritoneum was red, thickened and covered with the gelatinous mass, which was adherent to it; there were no changes in the uterus, but the appendix was enlarged cylindrically from the tip to within about a centimetre of the cæcum, and was about the size of the little finger; when it was cut off a quantity of gelatinous matter escaped similar to that in the ovarian cyst.

Microscopic examination of the wall of the ovarian cyst showed high palisade epithelium in great abundance, and for the most part in an advanced stage of degeneration. Here and there well-preserved goblet-cells distended with secretion were seen; generally, however, the cell bodies were converted into a coarsely granular *débris*, the nuclei at their base being well preserved. On examining the wall of the appendix the greater part of the mucosa was found to have been destroyed; patches remained, however, which showed aggregations of coarsely granular amorphous material adherent to their free surface—representing the colloid. The epithelial cells themselves were either distended to bursting point with secretion, or the bodies were destroyed, leaving the nuclei either alone or along with a certain amount of granular amorphous material. It was quite clear, from these appearances that the *colloid material contained in the appendix was the product of its own mucous*

membrane, and was, therefore, in its origin, *independent of the ovarian cyst.*

The simultaneous and independent occurrence of this colloid disease in the ovary and the vermiform appendix has not, I believe, been previously recorded. The disease is epithelial in origin, and the fact that it may simultaneously arise in two types of epithelium of such divergent characters as that of the ovary and the appendix is curious and interesting.

The analogy between our case and the one just cited is complete with the exception that, in the first place, the disease appeared later in the appendix, corresponding in point of time with the appearance of the secondary tumour, while in our case it corresponded with the primary disease of the ovary. Moreover, the disease in the case of Eden's patient was not so fully developed as in our own; the cyst of the appendix in his case was very far from the bursting point, while in our case there were three perforations of the appendix, seeming to prove a more violent and virulent progress of the disease.

Whether this will be bad for the patient in the future is difficult to say definitely, as the operation was only performed two years ago; but, on the other hand, in Eden's case, the appendix was not examined at the first operation and might have been attacked beforehand.

In our case the cystoma of the left ovary, the right appendages and the appendix were removed at the first operation, which justified the hope that there would be no relapse. We could not be quite certain of this because some gelatinous matter might have been overlooked and remaining in the abdominal cavity caused later a recrudescence of the disease.

We had just completed our paper when we happened to learn of one case more, similar to our own; namely, that of T. W. Bailey.

The author describes his case and cites those of Eden, Wilson and Rathe above mentioned, which he calls cases of pseudomyxomatous appendix, complicated by an ovarian cyst of large size. In all cases there had been a rupture of the ovarian cyst with resulting pseudomyxoma peritonei. The case is very interesting because of the evidently primary involvement of both ovary (left) and appendix; symptomless rupture of the ovarian cyst and the complete dissemination over the peritoneal cavity and its contents following this liberation of pseudomucin.

The question of the malignancy of the pseudomyxoma of the peritoneum arising from ovarian cystoma has been dealt with by Pfannenstiel (Werth's *Handb. der Gyn.,* Bd. IV, s. 160), and the conclusion at which he arrives is, in the first place, that though a complete recovery or, at any rate, the repression of the disease for a

long period, may be possible, so favourable an issue is unfortunately getting rarer and rarer; and, in the second place, that a differentiation must be made between those cases in which the disease is of rapid growth and those in which it has taken years to develop, as an example of which he cites the case of Fritsch—Olshausen, the patient dying 17½ years after the first operation.

According to Eiger the chances of a complete recovery depend very much upon the age of the cystomata which are the cause of pseudomyxoma peritonei; in cystomata of recent date, in which the epithelium is more prone to growth and the production of mucus a more rapid relapse is to be expected.

Lahm, in his paper entitled "On the hystogenesis of the pseudomucinous cystomata of the ovary," discusses their origin from Walthard's cells, which occur in the normal ovaries. He recognizes when the cystoma is removed from the diseased ovary the importance of an examination of the apparently healthy one; this would render possible observation in their initial stage of changes similar to those which had taken place in the diseased ovary.

Lahm further says that pseudomucinous cystomata and Walthard's accumulation of cells may be a predisposing cause of the production of solid or glandular carcinoma. He does not, however, touch upon the subject of malignancy of the metastases of the pseudomyxomatous masses themselves, although this subject is of very great interest to us in the determination of the malignancy and cause of metastases and particularly of relapses of the disease, which have been observed especially in cases of pseudomyxoma of the peritoneum (see for example Rathe's case and others).

Polano, in describing his case of pseudomyxoma peritonei and cystomata ovarii, notes the peculiarly sharply progressive and destructive character of the disease, both in an anatomical and clinical sense; he suggests at the conclusion of his paper that for all practical purposes the disease must be divided into two classes: the first is the cystadenoma pseudomucinosum peritonei simplex, which represents a simple superficial metastasis arising through the implantation (Olshausen's "Implantation Metastase"): the second, the cystadenoma malignum pseudomucinosum peritonei, the most typical case of which is his own. The difference between the malignant and simple kinds lies only in the degree of liability to relapse.

One case of special malignancy with metastases penetrating the greater part of the abdomen and spreading to and perforating the intestines, was described by M. W. Meyer, who, basing his opinion on this case, considers that it contradicts the idea of the benignancy of this tumour; on the other hand, he cites another case, in which the

patient was 65 years old with metastases on the peritoneum but benign in character.

From among the earlier authorities we can cite Peters, who gives his opinion as to the unfavourable prognosis of the pseudomyxoma peritonei ex appendice.

Shumann also deems pseudomyxoma peritonei to be a dangerous disease owing to its disposition to relapse and the producing of cachexia, and classes this disease with the special kinds of carcinoma, *i.e.*, with colloid cancer.

S. Wiener describes his case, in which at first a pseudomucinous cystoma of one of the ovaries, quite benign in character, was removed; the other ovary was normal, but two years afterwards there appeared in it an immense cystoma of the same shape which, on microscopical examination, was found to be quite benign, although there were ascites and a dissemination of gelatinous masses, which could not be removed from the peritoneum. Two months after this operation there were symptoms of increasing ascites and the patient died; there was no autopsy. The author thinks that the process in the second ovary was quite independent of that in the first.

Cases similar to this seem to us very important and demonstrative in the sense that there appears in the organism some peculiar predisposition to identical neoplasms, arising in various organs and at diffrent times. For example, in Wiener's case, as also in many others, the disease appeared first in one ovary and then in the other, and both, in Eden's case and our own, in one ovary and the appendix. Further, Wiener's case is interesting because a tumour benign in a histological sense, becomes very malignant in its clinical course.

In view of this fact Wiener puts the question as to how the second ovary should be dealt with when removing the cystoma of one of the ovaries; he suggests cutting out a piece from a part which looks at all suspicious and examining it before closing the abdomen.

Wiener, from his own experience, further confirms, in the following conclusions, Pfannenstiel's view upon the prognosis for cystomata of ovaries. One-third of all proliferating tumours of the ovary have an incontestably malignant character; in the other two-thirds the malignancy is potential. The question as to malignancy can only be determined by the clinical course of the disease. Usually these tumours are histologically benign, but may cause death by the perforation of the walls of the cystoma allowing its contents to escape and resulting in the spreading of metastases on the peritoneum. Every tumour of the ovary should be removed by laparatomy as soon as possible with the contents absolutely intact. If it has burst of itself, then the sooner the operation is

performed the better. When removing a unilateral cystoma of the ovary, the other ovary, macroscopically normal, must be left, if the cystoma does not contain any incontestable malignancy or excessive papillomatous growth. All patients after the removal of the one ovary in consequent of cystadenoma, must be periodically examined with respect to the remaining ovary.

Subsidiary to his own case, Wiener quotes Nicholson's, which was examined in L. Pick's laboratory. A woman, 60 years old, had an absolutely benign pseudomucinous cystadenoma of the ovary, while at the post-mortem all the symptoms of malignancy, such as the spreading of the disease to the neighbouring tissues and organs with protrusion of the cervix of the uterus, and multiple metastases by means of the blood-vessels to the lungs, which produced a very rapid fatal issue. This case seems to Wiener to be unique.

Further, A. Hahn in his dissertation proceeding from the same laboratory (L. Pick's), discusses in detail the question as to the manner in which the walls of a pseudomucinous cystoma are perforated. According to him there are to be seen here and there a separation of the parallel sheets of the connective-tissue by accumulation of transparent matter, very lightly stained by eosin. Those places in which the solid connective-tissue has been replaced by the colloid matter coming from within, are most liable to rupture; the blood-vessels are without surrounding tissue and seem to be quite isolated, gigantic polynuclear cells are visible.

Hahn finishes his paper with a list of cases which were collected by him, which he does not pretend to be quite complete, and although many other cases have been described since the publication of his paper, particularly those of pseudomyxoma peritonei arising from the appendix, we should like to cite his account which characterizes the prognosis of this disease. Out of 60 cases collected by him 23 died, *i.e.*, 39%; only in a very few cases patients who had been operated from four to nine years previously were traced, the greater number were of no longer date than a year or even a few weeks.

Further, Eden notes that "regarded as bordering on malignancy many ovarian cases are on record where complete recovery has followed an operation, which must be called partial, owing to the difficulty of removing the colloid adhering to the peritoneum; in the present case the patient has remained well up to the time of writing, one year and eleven months after the operation."

Quite unique is the opinion of W. Nagel, who, at the VIth International Congress of Gynæcology and Obstetrics, held in Berlin in 1912, demonstrated one example of myxoma of the ovary.

According to him the gelatinous contents which filled the separate cavities of the cystoma of the ovary and escaped into the

peritoneal cavity and which clinically consisted of pseudomucin, appeared to be not of epithelial, but of connective-tissue origin.

He therefore considers this disease to be benign, which fact is confirmed by its clinical course. Unfortunately Nagel has not explained his hypothesis to an extent sufficient to allow of our forming a definite opinion. Probably at some future time he may supply us with more facts, which will enable us better to judge of the correctness of his views. We cite his opinion at present for the purpose of showing that this author had to invent a new hypothesis as to non-epithelial origin of this tumour in order to prove the benignant nature of the disease.

While the pseudomyxoma peritonei arising from a cystoma of the ovary has according to the majority of authorities a bad prognosis, the cases arising from the appendix have a more favourable one; which fact is confirmed by those who have written upon the subject. B. M. Leontieff, for instance, collected 21 cases, his own making the 22nd, and to these we, of course, under correction, must add those of Christian, Trotter, Meriel and Daunic, Rathe, Wilson (two cases), Eden, Paczek, Cagnetto, our own case bringing the total up to 32.

According to T. M. Pikin the pseudomyxoma of peritoneum is in the pathological sense benign, but clinically is not an innocent disease.

Paczek, who cites from the literatude on the subject ten cases of pseudomyxoma peritonei arising from the appendix, emphasizes the difference between this kind of disease and that arising from the cystoma of the ovary. In the first kind the prognosis must be absolutely good. Although the epithelial cells escape from the appendix with the gelatinous masses, they are not, according to Oberndorfer, liable to rapid growth, and while they may remain a long time do not produce new tumours.

B. M. Leontieff is of much the same opinion in considering the pseudomyxoma of the peritoneum arising from the appendix to be a benign process.

Bailey says that "there is no record to my knowledge of malignancy following a pseudomucin cyst of the appendix, but by the plastic peritonitis and mechanical interference which follow such an extravasation equally dangerous conditions may develop."

What prognosis, however, can be made in cases in which both causes of pseudomyxoma peritonei are present? There are very few such cases, probably owing to the fact that formerly in describing cases arising from the ovary no attention was paid to the appendix, or it was presumed to have been attacked by the disease in the same way as the other organs of the peritoneal cavity. Among those cases in which both appendix and ovary

are affected, there is not one in which it can be said that the appendix was primarily attacked; moreover, as in cases arising from the ovary the prognosis is worse than in those arising from the appendix, the prognosis in such cases must be made cautiously and perhaps a recurrence is more to be expected.

Very interesting is the question of the malignancy of pseudomyxoma of the peritoneum, for, in many cases, which ended in death, there was proved to be a total absence of really malignant growths, and besides there was no metastasis of the gelatinous masses. These latter getting malignant become progressive in character and give rise to metastases, remaining the while microscopically similar in structure to the benign cases (see Polano, Rathe and others).

Evidently a final decision upon this matter will not be arrived at until the question of the ætiology of the malignant tumours become clearer. Further microscopical and experimental researches may explain how the same gelatinous matter in some cases manifests a destructive quality.

We had just completed our paper when we happened to learn of a dissertation by Dr. Erik Ahlström of Stockholm. Although it is not of quite recent date, being written in 1909, it contains details relating to the gelatinous cystomata of the ovary and the changes arising on the peritoneum after their rupture. We quote from this paper at length because it has not been referred to before.

This paper, which is in the form of a monograph, contains a historical sketch in which the question as to the correctness of the nomenclature of the disease is discussed.

Cases collected by the author from the various clinics of Sweden are described.

In nine of the cases the changes in the peritoneum were microscopically examined and they are described fully; the other 19 cases were only clinically observed with, in some of them, a microscopical examination of the ovaries only. These nineteen cases are tabulated but not described in detail. The author further deals with the pathological anatomy of the cystomata and the changes on the peritoneum from the macro- and microscopical standpoint, and completes his paper with a clinical study of the disease exemplified by some very fine reproduction of the microscopical preparations.

Discussing the question of the metastases of the epithelium and the spread of them on the peritoneum, the author relates that in two of his own cases, as in the cases of Eiger and Schumann, the epithelium appeared of a clearly carcinomatous character, but in other cases it was quite impossible to ascertain from the anatomical peculiarities of the epithelium of the burst cystoma and the metas-

tatic tumours on the peritoneum, the liability of the tumour to cause metastases. The solution lies apparently in the different capacity of the epithelium of the gelatinous cystomata to proliferate; this liability is not recognizable in the present state of microscopical examination; moreover, in various cases, the organism does not possess the same degree of resistance, particularly the resistance of the peritoneum, when the epithelium of the burst cystoma escapes into the abdominal cavity.

Owing to these circumstances although the gelatinous cystomata are anatomically benign like the ordinary pseudomucinous cystomata, they must be considered as occupying a position between the benign and malignant tumours.

As regards the nomenclature of the pseudomyxoma peritonei, the author does not agree with it, for many reasons: it does not explain itself. Authorities, he claims, have given this name to different diseases, and he in his microscopical preparations proved that the most important are the metastases of epithelium, but not the process of organization, which was advanced in the first place by Werth. The author prefers to cancel this nomenclature, giving to each case its proper name, including the different parts attacked, for example—a gelatinous cystoma with bursting and forming of metastases on the peritoneum, growing into the latter. If no microscopical examination took place, it is better to employ the term "gelatinous changes of the peritoneum" than the first mentioned.

Personally we are more interested in the question of the participation of the appendix in this disease and in the conclusions come to by the author.

He observes that the term pseudomyxoma peritonei has been used in cases of men, in whom there were gelatinous deposits on the peritoneum, arising from the appendix, which had dilated to form a cyst and then burst.

Ahlström in three cases of his own found definite changes in the appendix simultaneously with the typical picture of the pseudomyxoma peritonei after the bursting of the gelatinous cystoma.

In the first of his cases (p. 30 and foll.) the changes on the peritoneum were not very marked, and the gelatinous masses were lying mostly free in large quantities in the peritoneal cavity, being adherent here and there, including the exterior surface of the cystoma and the right tube; it was also noted that the appendix was distended like a cyst by mucous. "The latter must be taken as a metastases of the epithelium arising from the cystoma of the ovary; this cyst was not on the surface of the appendix but was covered by the peritoneum and by the muscle tissue; it is quite clear that the cyst occupied the place of one of two muscle sheets,

which were to be distinctly seen in places adjacent to the cyst." The author suggests that the metastasis from the ovary into the appendix had penetrated through the lymphatic vessels.

As the cystoma of the ovary and also the unique potentially proved metastasis in the appendix were removed, it may be supposed that the organism itself overcame the changes on the peritoneum; this is proved by the absence of a recurrence of the disease four years after the operation.

In the second (the 7th case of Ahlström, p. 59) it was impossible to find on operating the bursting place of the cystoma, which burst during the operation; the tumour was adherent to the anterior wall of the abdomen and there were on the peritoneum deposits of the gelatinous matter and a ruptured cyst of the appendix was also found; this cyst, judging by its epithelium and contents, was identical in nature with those in the cystoma of the ovary.

The cyst of the appendix was very interesting because the appendix was dilated in the form of a cyst only in the middle. The author considered that this could not be due to a simple blocking of that part of the appendix adjoining the cæcum, but was caused by the contents of the ruptured cystoma of the ovary, having penetrated the walls of the appendix, gradually causing it to bulge in the direction of the lumen. The muscle layer had undergone considerable change, sufficient to explain the possibility of the bursting of the wall of the appendix.

In this, as in the previous case, there was no recurrence, although a period of two years and three months had elapsed since the operation; this was probably due to the fact that the primary seat of the disease has been removed.

The eighth case is a typical left gelatinous cystoma of the ovary, which had burst some time previously; there was also a ruptured cyst-like tumour in the appendix with the epithelium and gelatinous contents similar to those in the cystoma of the ovary; there were also changes in the omentum and on the peritoneum.

Further (p. 145 *et seq.*) describing the changes in the peritoneum after the bursting of the cystoma, which appeared as multiple cyst-like tumours, Ahlström notes that the appendix and the adjacent part of the cæcum are the places where these tumours very frequently arise. He cites also the case of Schlegtendal, one case of Peters' and one of Kret Schmar's.

"In these cases, as well as in all others, since described, it is seen macroscopically, that there are superficial tumours on the peritoneum, quite distinct from those inside the organ, which are covered by the peritoneum. In three of my own cases, in Westphalen's and the second case of Schumann's, on the contrary, it was possible to ascertain without the microscope that there were

secondary gelatinous cysts in the appendix itself, covered by the peritoneum." Something similar was observed in the author's fifth case, and also in Hirst and Marchand's cases, not in the appendix, but in the cyst-like metastasis in the wall of the intestine and in the appendix epiplöicœ."

The author explains the frequent occurrence of these metastases through implantation in the region of the appendix and in the pelvis by the fact that, by the bursting of the cystoma the lumps of gelatinous matter with the epithelium sink into the lowest places of the peritoneal cavity.

Further discussing the question of the metastases, he admits the so-called sub-peritoneal transfer of the metastases in those cases in which the peritoneum covering the secondary growth was unchanged. In these cases, according to him (p. 185), the absorption into the lymphatic ducts and the further transfer of the epithelial elements is the only explanation which can be admitted.

In all these passages we have quoted he considers the growths as of a secondary nature or as metastases, and only in rare instances (see p. 195) esteems it impossible to settle by an anatomical examination whether there are metastases due to implantation or new tumours.

Nowhere, however, does he mention the simultaneous appearance of the process in the different organs or the liability of the organism to the formation of tumours in various organs.

With regard to the appearance of metastatic " tumours in the appendix " the author emphasizes that its position in the pelvis is a predisposition to metastases.

The fact that Ahlström has dealt with the changes in the appendix without touching the question of pseudomyxoma peritonei arising from this latter organ is very interesting, because it confirms the possibility of a simultaneous existence of the tumours in the ovary and in the appendix or in both ovaries, in one of them a typical gelatinous cystoma, in the other one in its initial stage.

All of which reminds us of what was described some years later by Rathe, Eden and ourselves.

Ahlström himself could not decide whether there were metastases or the formation of a new tumour, but we think the latter supposition to be more probable; if it is true Ahlström's cases go to confirm the hypothesis that tumours identical in character with the cystoma of the ovary arise simultaneously with it or very shortly afterwards, in various parts of the body.

In cases in which there is excessive malignancy as in his fifth case and those of Westermark, Amiel, Polano and Meyer, Ahlström decided that all these cases must be acknowledged to be gelatinous

cystomata of the ovary, benign according to their anatomical construction, but with epithelium very liable to proliferate.

In these cases the epithelium, morphologically normal, is very similar to that in colloid carcinoma owing to the method of the spreading of the metastases, and in the biological sense these cases must be considered malignant.

" Apparently (p. 224) the same epithelium identical in all cases may have in some other different liability to proliferation, and, on the other hand, the resistance of the organism has a great influence on the issue.

Conclusions.

1. Pseudomyxoma peritonei owing to the investigations made since Fränkel's time must be divided into two kinds. The first, that arising from the bursting of a pseudomyxomatous cystoma of the ovary, and the second when the mucous matter which has been accumulated in the appendix ruptures the walls of the latter and escapes into the peritoneal cavity, later on spreading over the entire peritoneum.

2. There have been described many cases, in which the accumulation of the mucous matter resulted from both points of origin, *i.e.*, from the cystoma of the ovary and from the appendix; sometimes the time of its origin in these points was coincident or nearly so.

3. The examination of similar cases, particularly in the earlier stages of the process, we may hope, will elucidate the nature of this disease.

4. The question of the malignancy of the pseudomyxoma of the peritoneum is very interesting, but quite enveloped in doubt, and there is a great difference between some cases, which are definitely malignant and others in which there has been no recurrence of the disease during a period of more than 17 years.

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The Inefficiency of the Operative Surgical Methods in use for Permanent Sterilisation of the Female.

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Indications of anything approaching general acceptance for deliberate contraceptive sterilization in the female must be very few nowadays. I know of no one indication which is agreed by all obstetricians to be indisputable. Contracted pelvis as an indication is on the brink of final exclusion, and the more debatable indications of pregnancy in association with phthisis, chronic nephritis and osteomalacia have all more recently been subject to rather successful attack.

I take it as a truism that the considerations which would impel any operator to attempt preventive sterilization must be of the most emphatic nature. Ethically, the indication should be absolute and indisputable.

If the indication must be absolute, it surely follows logically that the operative procedures employed to achieve sterility should be absolutely reliable for the purpose. An uncertain result on an absolute indication is worse than useless.

That there is an absolutely certain operative method is, however, open to grave doubt. A careful search through the literature on the subject in the past 15 years shows the untenability of even the most radical methods in vogue, to the title of absolute reliability. Routh,[1] in his epoch-making study of Cæsarean section, gave a list of eight methods in use up to 1911. He stated that the removal of the Fallopian tubes, in whole or in part, was the method most in favour. It is an interesting fact that not one of the methods he mentioned has stood the tests of time and experience, and that the most unsatisfactory type of operation is the one which he stated then to be the most popular.

I was induced to investigate this subject by the failure of occlusion of the oviducts to prevent further pregnancy on two occasions in my own practice. In the first case, full-time pregnancy occurred after an operation involving simple ligature of the tubes and ventro-fixation for procidentia in 1909.

The second was a case of repeated intrauterine pregnancy after cornual excision of the Fallopian tubes for bilateral pyosalpinx. Though not unique, the latter case is of sufficient interest to appear worthy of fuller report. The history of the case is therefore as follows:—

Mrs. F., aged 24; married 12 months. Never pregnant. Complaining of increasing menorrhagia and dysmenorrhœa.

Examination on Nov. 3rd, 1915, showed uterus slightly enlarged and held in partial retroversion by adhesions. Both tubes thickened and tender to palpation. Appearances at vulva suggested chronic gonococcal infection though there was no acute history of gonorrhœa.

At the operation on Nov. 4th, 1915, the uterus was found to be held back by recent adhesions of both tubes to the floor of Douglas's pouch in the sub-ovarian fossæ. Both tubes were thickened to the diameter of a little finger and somewhat tortuous. There were no other adhesions. I excised both Fallopian tubes by cutting the interstitial portions widely out of the cornua uteri, and suturing the resultant cornual wounds deeply and thoroughly, with careful approximation of the peritoneal and muscular tissues. An apparently healthy appendix was amputated and the uterus ventro-suspended. Recovery was uninterrupted.

Re-examination on July 5th, 1917, showed the uterus loosely attached to the abdominal wall; slightly metritic; no trace of pelvic inflammation. Patient reported herself as "feeling splendid."

On February 15th, 1918, her doctor reported that she had had a miscarriage after an air raid. He judged the fœtus (a male) to be about $4\frac{1}{2}$ to 5 months of age. Another early abortion occurred about May 1919.

The operative methods in vogue to the present time to achieve permanent sterilization have been of every conceivable type. The following is a complete list compiled from all the literature I have been able to investigate on the subject in the past 15 years. Any reported cases in which the history of the case or the technique of operation are doubtful have been excluded.

The methods may be divided, for purposes of classification, into four anatomical types:—

(1) Ovarian.
(2) Tubal.
(3) Uterine.
(4) Ovarian, Tubal and Uterine.

The particular types under each heading are as follows :—

1.—Ovarian. Ablation of ovarian function has been attempted by :—

(1) *X*-rays.
(2) Surgical ablation of ovaries.
(3) Burying of ovaries under peritoneum or in closed peritoneal pockets.

2.—Tubal (bilateral) ablation by :—

(1) Simple ligature.
(2) Tubal crushing—more or less extensive.
(3) Crushing with subsequent ligature.
(4) Double ligature of tubes and division between.
(5) Double ligature of tubes and division between with burying of the proximal tubal stump under peritoneum.
(6) Excision of a portion of tube between ligatures.
(7) Excision of whole tube (leaving a stump only).
(8) Excision of whole tube and uterine cornu with suture.
(9) Burial of uterine fundus extraperitoneally after ablation of whole or parts of tubes.
  (*a*) Between bladder and vagina (as in Watkins-Mackenrodt operation).
  (*b*) In abdominal wall (as in Kocher's operation for prolapse).
(10) Burial of fimbriated end of tube under peritoneum.
  (*a*) In broad ligaments.
  (*b*) In inguinal canals.
(11) Invagination of fimbriated ends of tubes.
(12) Tubal cauterisation by chemicals or heat.

3.—Uterine ablation by :—

(1) Atmocausis (hot vapour injection).
(2) Radium (intra-uterine).
(3) Hysterectomy alone (total or sub-total).
(4) Hysterectomy with tubal ablation.

4.—Ablation of uterus, tubes and ovaries.

A consideration of this catalogue seriatim is of interest from the point of view of the relative efficiency of the various methods.

1.—Ovarian Methods.

The first two ovarian methods (bilateral oöphorectomy and X-ray irradiation) call for brief consideration. The possible unhappy after effects of these operations, even if successful, are

sufficient of themselves to make them unpopular methods. But apart from this, experience has abundantly proved them to be unreliable. The difficulty of certainly removing all ovarian tissue by local operation is well known. Well authenticated instances of pregnancy, after apparently complete bilateral ovariotomy, have occurred in the practice of such reliable operators as Doran[2] and Meredith,[3] and later of Heogh.[4] Sutton[5] and Doran[6] also report its occurrence after bilateral oöphorectomy. Isolated areas of functioning ovarian tissue, frequently situated far from the normal ovarian sites, and often detectable only by microscopic examination, are more frequent than was at one time believed. Beigel[7] collected 23 cases of supernumerary ovaries, Von Winckel[8] 18, and Seitz[9] 5, previous to 1909. Authentic cases have also been reported by Frankl,[10] Reis,[11] Sippel,[12] and Franks.[13] Doran[14] discusses the occurrence of accessory ovaries in his "Harveian Lectures on Fibroids." Mériel[15] says they are present in 4 per cent. of all females.

These facts indicate definitely that sterilization by ovarian excision cannot be depended upon. The same may be said of X-ray sterilization. I have known cases of apparent failure to sterilize (at least in a given number of irradiations) even with recent apparatus; and the experiments of Claud Regaud[17] in guinea pigs, cats and bitches show that absolute reliance cannot, so far at any rate, be placed on this method.

The third ovarian method (burying ovaries in closed peritoneal pouches) is recommended by Blumberg.[19] The operation has not often been done. Jacques,[20] however, reported a case last year in which it had been done in combination with hysterectomy, and in which pregnancy occurred four years later. I shall refer to this case later.

This method is open to even greater criticism than oöphorectomy in the matter of unreliability, for, in addition to the possibility of the presence of accessory ovarian tissue in any individual, there is the known tendency to slow resolution of aseptically produced peritoneal adhesions and the consequent opening up of artificial peritoneal pouches.

2.—Tubal Methods.

The multitude and diversity of tubal methods is a fair indication of the unreliability of any one of them.

First tubal method—simple ligature alone—is a long discredited method, but is still used at times as a temporary expedient. Cases of pregnancy after ligature alone are reported, during the period surveyed, by Jung,[21] Griffith,[22] Planchu,[23] Leonard[24] (2 cases), and McArthur.[25] Christopher-Martin[26] has also had a case of this

type. In two at least of these no trace of tube constriction or ligature was observable at later operations. In Planchu's case both tubes were found completely divided at the site of ligature at a later operation. The divided ends of the proximal portions of the tubes appeared to be closed, but pregnancy occurred two months later. Munro Kerr[27] found the divided tubal ends patent at a later operation on two occasions after previous ligature. Offergeld[28] found the same thing in experimental tubal ligature in bitches. A number of other cases have been reported at different times.

The second tubal method—ligature after crushing the tubes—and *the third*—tubal crushing alone—were also shown by Offergeld[29] to fail at times. Casalis[30] gives a full report of a failure after crushing and ligature in a patient of his own.

Fourth tubal method—Simple division of the tubes between ligatures—though still popular, was shown to be unreliable by Fränkel[31] in animals, and Zweifel[32] in woman. Purslow[33] had a case of normal pregnancy after this operation had been done, and Munro Kerr[34] mentions other recorded cases. In any case the anatomical conditions resulting from this operation are exactly the same as occur in cases in which the tube has been divided in the process of removing a portion—and after this latter operation there are an unusual number of failures to record.

Fifth tubal method. It was thought that the further refinement of covering the proximal cut ends of the divided tubes under peritoneum would prove an absolute safeguard, but Crook[35] reports one case of full-time pregnancy after this method, in which there seems no reason to doubt the use of an accurate technique at operation; and there are others on record (cf. Leonard).[24] Eight cases reported by Hirst,[36] Polak[37] and Mainzer,[38] in which intra-uterine pregnancies occurred after total tubal excision with peritoneal in-covering (in the process of extra-peritoneal burial of the fundus in the Watkins operation for prolapse) are analogous cases in this class, and show the futility of covering the tubal ends under peritoneum. These cases are quoted, however, in a later category.

Sixth and seventh tubal methods—Excision of a portion of the tubes between ligatures; and excision of all but the uterine stumps of the tubes.

The essential resulting condition in these operations is the same whether the divided distal portion of the tube be removed or not. The non-patency of the stump, or portion connected up with the uterus, is the only thing that counts from the point of view of preventive sterilization. If it can be shown that this uterine portion may become patent again after ligature, the fact invalidates all operations of this type, from simple division between ligatures

to excision of the whole tube with ligature of the merest remaining stump. That this type of operation is extremely unreliable has, however, been shown in a number of instances.

Cases have been reported by Wood,[39] Clark and Norris,[40] Polak,[41] and Mainzer. It appears certain that Doran's, Stanbury Sutton's and Meredith's cases of pregnancy after bilateral ovariotomy (previously noted) must appear under this heading as well; and also two cases reported by Cripps and Williamson.[42] Leonard mentions one case in his own hospital and notes that a number of others have been reported. In the case reported by Clark and Norris, a full-time normal intra-uterine pregnancy occurred after amputation of bi-lateral large pus tubes. One ovary was also removed. In Polak's cases both tubes were removed for tubal inflammation. An intra-uterine pregnancy with normal labour at term followed in one case, and in the other an interstitial pregnancy occurred on the right side. In Wood's case pregnancy occurred in the proximal tubal stump on the right side after bi-lateral double ligature, and excision of the intervening portion of the tube, during an operation for prolapse. In the case reported by Mainzer, pregnancy occurred after excision of the tubes and burial of the fundus extra-peritoneally.

In addition to the above cases, there are very numerous cases of pregnancy in the tubal stump left after unilateral salpingectomy. Cases of this type are reported by Lesse,[43] Hofmeier,[44] Morbit,[45] (after removal of a pus tube), Clifford,[46] Campbell,[47] Pearson,[48] and Clark and Norris.[49] In Lesse's and Hofmeier's cases the pregnancy was in the interstitial portion of the tube. Lesse's case went to the sixth month. In Pearson's case the cut ends of the tube were found united at subsequent operation for extra-uterine pregnancy in the same tube. It is unbelievable that the impregnated ovum in these cases had reached the tubal lumen by any other means than the re-opening of the ligatured end of the tubal stump.

The eighth tubal method.—Bi-lateral excision of the whole tube and uterine cornu, with suture of the cornual incision in single or double layer—has also been a popular method. But I have reported above a case in which it failed, and Coventry[50] and Beckwith Whitehouse[51] have had similar cases. Coventry's case went to labour at seven months, and Whitehouse's to full time. In Whitehouse's case both tubes were excised out of the cornua for hydrosalpinx.

Polak[52] reports an interstitial pregnancy after a radical (cornual) salpingectomy on the same side.

Hirst had three cases of intra-uterine pregnancy, and Polak four, after operations for prolapse, which involved not only

bi-lateral cornual excision, but extra-peritoneal implantation of the fundus between the bladder and anterior vaginal wall.

Two of Polak's cases went to, or near, full time, and one other to six months. Hirst's three cases all ended in uterine abortion about the third month.

Polak advises, as an additional refinement to cornual excision, the crushing of the severed tubal ends, and the suturing of them to the posterior uterine wall. I cannot see the object of this operation, or how it will make the attainment of sterility any more certain.

It is illuminating to know that Fränkel, so long ago as 1905, stated that sterilizing operations of this tubal excision type were useless, as a utero-abdominal fistula could always develop.

The ninth tubal method—Burial of the uterine fundus extra-peritoneally after ablation of both tubes in whole or in part.

(*a*) Burial between bladder and vagina (in Watkins-Mackenrodt operation for prolapse) has failed three times in Hirst's experience, four times in Polak's, and once in Mainzer's, as above quoted. In Hirst's cases the cornua were excised as well, while in Mainzer's the tubal stumps were left. In the latter case there is a slight doubt as to whether the pregnancy ante-dated the operation or not.

(*b*) Burial in the abdominal wall as in Kocher's operation. I can find no case of pregnancy after this operation in the literature investigated, but its essential similarity to the previous operation from the sterilizing point of view is obvious, and it is open to equal objection. The same may be said of Stettin's[54] operation, in which the unexcised tubes are buried with the fundus uteri.

The tenth tubal method—Embedding of the fimbriated ends of the tubes under peritoneum—is probably the most popular method of all nowadays.

It is most commonly done by burying the fimbriated ends in pockets, or through incisions, on the anterior aspects of the broad ligaments, though Menge[55] advised secreting them in the inguinal canals. A failure of this operation, in its broad ligament form, is reported by Child.[56] His patient was first operated on in Nov. 1913, for prolapse, and was sterilized by embedding the fimbriated ends of the tubes in retro-peritoneal pockets cut in the anterior face of the broad ligaments. They were fixed in place by a continuous enclosing suture of fine silk.

The abdomen was opened $3\frac{1}{2}$ years later on a diagnosis of left tubal pregnancy. The fundus was opened by transverse incision, and an apparent interrupted early pregnancy cleared out. No fœtus was found, but the pathological laboratory reported evidences of pregnancy. Examination at operation showed no sign of communication between the peritoneal cavity and the embedded right

tubal ostium, but in one place there was a pin point communication on the left side. There seems no reason to doubt the thoroughness and carefulness of Child's technique at either operation.

Culbertson[53] describes a more complicated operation with the similar aim of excluding the fimbriated ends of the Fallopian tubes in an artificial peritoneal sac. He has performed it 31 times without a recurrence of pregnancy. He quotes an extensive literature on the subject.

As regards Menge's method I know of no case of failure, but I cannot think it gives hope of greater certainty of sterilization than even more complete operations, such as the Watkins-Wertheim-Mackenrodt method; and yet this latter has failed on several occasions, as we have seen.

Eleventh Tubal Method. Child thinks a surer way would be to invert the fimbriæ into the tube, and then close the lumen with a purse-string suture. A recollection of the failure of tubal occlusion by suture, ligature, etc., leads one to the conclusion that his optimism is hardly justified.

It is remarkable that aseptic operative procedures to close the Fallopian tubes should so often fail to achieve permanent success, in the face of the known frequency of tubal infection as a cause of permanent closure and sterility. Incidentally the closure in infective cases, be it noted, is practically always at the fimbriated end. It seems an obvious inference that the presence (at least in the initial stages) of some degree of inflammation, beyond that which can be produced by aseptic, or antiseptic methods, is necessary to obtain permanent adhesions. Ligature, suture and excision (with the addition of sub-peritoneal burying), have all failed.

The presence of live organisms, probably of pus-forming type (B. coli, gonococci, strepto- and staphylococci) appears to be necessary, and it would seem that even tubes closed in this way may reopen when the organisms have died out (*e.g.*, Lochrane, Norris, Morbit). Closure at the fimbriated end is most likely to effect sterility as it has been frequently shown that the tubal lumen at the uterine end is rarely, if ever, truly closed in tubal infections (Landau,[57] Reymond[58] Albers[59]).

Twelfth tubal method—Cauterisation by chemicals or heat.

Fränkel, in his experiments on animals, failed to close the ends of tubes divided by the cautery in their continuity. I have been unable to find any report of this method having been tried in the human subject. Dickenson[60] reports a method of electro-cauterisation of the intra-uterine tubal openings through the uterine cavity, but is not convincing as to its reliability. He gives no particulars of any cases. Considering the results of Fraenkel's cautery experiments on the abdominal portions of the tubes on the one

hand, and of intra-uterine atmocausis on the other, it appears more than possible that sterilization, if effected at all, will be at best temporary. The method is a dangerous one. Tubal sterilization by strong chemicals applied, via the uterus, was recommended by Froriep,[61] but has never been taken up. It is open to even greater objection than the cautery.

Lastly, Lecène[62] mentions that cases have been reported of pregnancy in an accessory Fallopian tube.

Having considered the uncertainty of tubal methods of sterilization, let us consider the third great class—the uterine methods.

3. Uterine Methods.

Uterine exclusion has been advocated by the operation of atmocausis (practically a cooking of the uterine mucosa by hot vapour injection) and by hysterectomy, with, or without, tubal ablation.

Atmocausis (first recommended by Pincus) has stood condemned for some years as being both uncertain and dangerous. Occurrences of pregnancy after apparently successful sterilization by this operation are reported by Meyer,[63] by Baumgart and Beneke,[64] and by Stolz.[65] In Baumgart and Beneke's case the operation was followed by four years of amenorrhœa, and then by pregnancy. Hysterectomy was necessary. Examination of the specimen after operation showed a total absence of decidua in the region of the placental site.

Claims have recently been made in favour of the intra-uterine use of *radium* and *radium emanation* as a sterilizing agent. Amenorrhœa is usual after the intra-uterine use of radium for intractable menorrhagia, etc. A long enough period has not elapsed to allow of a final opinion being formed as to the permanency of the effects of radium. Its action appears to be localized to the uterus, and in this respect it resembles atmocausis. Amenorrhœa alone cannot be accepted as a sign of sterility. It does not appear that the destruction of endometrium by the action of radium could be any more thorough than that caused by atmocausis in Baumgart's case, and yet subsequent pregnancy occurred in that instance. Theoretically, as the intra-uterine application of radium does not destroy function in the ovaries or tubes, it appears by no means impossible that impregnation may occur at some later period after its use.

Supra-vaginal hysterectomy alone is advised by Bland Sutton,[5] Jardine,[68] Munro Kerr,[27] and others, when absolute certainty is desired. Other operators go further and excise the tubes as well,

These may seem the methods of finality, but Taylor[66] states that tubal pregnancy has occurred on one or two occasions after vaginal hysterectomy. Even after supra-vaginal hysterectomy with bilateral salpingectomy, removal of one ovary, and the burying of the other under peritoneum, pregnancy has occurred in at least one case. This case is reported by Jacques.[20] The patient showed signs of pregnancy four years after Jacques had performed the above operations. A fœtus 9 cm. long was extracted by posterior colpotomy.

There seems no reason to doubt the facts of Jacques' report, and, in face of what is known of the vagaries of the peritoneum, the occurrence is not at all improbable.

As a corollary it appears that a *total ablation of uterus and pelvic adnexa* might occasionally fail to prevent subsequent pregnancy in the presence of accessory extra-pelvic ovarian tissue.

General Conclusions.

1. There is no absolutely reliable method of achieving sterility by surgical means. Pregnancy has occurred under such anomalous circumstances as to suggest that there is a definite *positive* chemiotaxis between ovum and spermatozoon. Whatever views medical science may from time to time hold on the question of the place of sterilization operations in surgery, Nature hardly appears to approve of them.

2. No reliance can be placed on methods involving ablation of ovaries or Fallopian tubes.

3. No reliance can be placed on any method which involves seclusion of structures (ovarian or tubal) by covering them under peritoneum. The conclusion is forced upon one that peritoneal adhesions, produced by any method not involving organismal infection, will resolve in time (probably within 3—4 years); and conversely that the most effective means of producing sterility is by infection.

4. There is a definite tendency towards restoration of the tubal lumen, in the absence of infection, no matter what means have been used to occlude it. This tendency is greater the nearer the lesion is to the uterine end of the tube, and is most marked at the tubo-uterine ostium—where a fistula is liable to form even when the excised tube has contained pus.

There is abundant literature in support of the view that the lumen of the cornual portion of the tube is not obliterated as a rule in cases of hydro- and pyosalpinx. The usual cause of the obstruction to the outflow at the cornual end in these cases is kinking of the tubal mucous membrane only (Landau,[57] Albers,[59] Reymond[58]). There is a definite liability to extra-uterine gestation in the stumps

of tubes proximal to the site of division after non-radical salpingectomies. A similar tendency has been noted by Giles,[67] and Polak, after conservative salpingostomy. This liability for conception to take place immediately proximal to the lesion in the tube, suggests :

(*a*) That the ovum has reached the tubal lumen through the opening-up of the cut end, rather than by traversing the other tube, uterine cavity, and tubal stump (reversely).

(*b*) That in performing salpingectomy it is best always to excise the tube out of the uterine cornu, so that should a fistula form, and pregnancy occur, it may do so in the uterus, and not in the tubal stump.

There is some reason for the suggestion that excision of the tubes out of the cornua, far from being a good method of securing sterility, is possibly the most hopeful and safest form of conservative operation ; and that it is of wider application than the usual conservative salpingostomy, as it allows of restoration of permeability even in the presence of large pus tubes. (There would appear to be a greater tendency to abortion when pregnancy occurs after this operation than in pregnancy under normal conditions. This may, however, possibly be due to associated inflammatory conditions in the uterus, and not to the operation itself.)

5. If an attempt is to be made to sterilize by tubal operation, interference would appear to be most hopeful at the fimbriated ends of the tubes. This is nature's site of closure in inflammatory conditions, and pregnancy has occurred in previously sterile cases after removal of the closed fimbriated end and larger portion of the tube in cases of pyosalpinx.

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The Causes, Prognosis and Treatment of Sterility.[1]

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The subject of sterility in women does not derive its importance from considerations of the preservation of health or the saving of life, as is the case with many subjects in obstetrics and gynæcology. Its importance has other sources, not less worthy of the careful attention of the medical profession, and recognisable as being of two kinds, the one concerning the welfare of the State, and the other the happiness of the individual. A nation with a falling birth-rate is usually a decadent nation; and a falling birth-rate, though doubtless in a measure dependent on social and economic conditions, is partly the result of sterility, which, in turn, is in some degree preventable or curable. On the other hand, the childless home lacks one great source of human happiness, and one great factor in the welding together of ideal family life.

We, as members of the medical profession, and especially as exponents of the diseases of women, can do something towards the prevention and cure of sterility; and therefore no apology is needed for discussing the subject in the Obstetrical and Gynæcological Section of the Royal Society of Medicine. We can do something else, which is by no means unimportant; we can recognise those cases in which sterility is inevitable and incurable. When it is quite certain that a woman cannot bear children it is much better that she and her husband should know the truth and face the disappointment once for all. Not only are they saved the constantly recurring disappointment that marks each appearance of menstruation; they are also able to adjust their lives to the facts: I am persuaded that many a husband and wife, if they knew early in their married life that they could not expect to have a child of their own, would adopt one, and thus find at least a partial outlet for the expression of those instincts of fatherhood and motherhood the unsatisfied repression of which mars the happiness of so many families.

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In this communication I propose to touch on two of the general aspects of the subject, namely :—

(1) The prevalence of sterility.

(2) The responsibility of the male partner,

and then sketch out, as briefly and clearly as possible, three types of sterility in women, viewed from the standpoint of prognosis and treatment, namely :—

(3) Inevitable and incurable sterility.

(4) Functional sterility.

(5) Conditions that cause or favour sterility, but allow of treatment.

Data and statistics referred to are derived from my recent monograph [1] to which I need not make more particular reference. The references to authors quoted will be found there, unless otherwise specified.

1. The Prevalence of Sterility.

Estimates of the proportion of infertile marriages vary widely with different authors and in different countries. Some, like Frank and Burdach, place it as low as 2 per cent., others as high as 20 per cent.

I endeavoured to form an estimate from my case papers, with the following results :—Among 3,128 married women who were seen *as patients* the percentage of sterile cases was 22·2. Many of these, however, were still young and might yet conceive; when I took into consideration only women who had reached the age of 40, the percentage dropped to 15·3. In a large proportion of cases the women sought advice on account of some disease of the reproductive organs; comparing such a group of women with an equal number drawn from the community at large, it is certain that the number of sterile women in the latter group would be notably less. It is, therefore, I think, a sound deduction, that the proportion of sterile marriages is well below 15 per cent. Dependence upon figures given by various writers is weakened by the fact that in some statistics still-births are taken into account while in others they are not.

Miscarriages and extra-uterine pregnancies are mostly overlooked or ignored. Yet it is obvious that a woman who has conceived is not sterile, even though the ultimate product of conception be not a living child. Of published estimates I am disposed to regard those of Simpson as being nearest to the truth; he found the proportion of unfruitful marriages to be 10·9 per cent.

1. "Sterility in Women," by Arthur E. Giles, M.D., etc. London : Henry Frowde, Hodder & Stoughton, Oxford University Press, 1919.

in village communities; and 16·3 per cent. in families of the aristocracy. The ratio is probably higher among dwellers in towns than among dwellers in the country. In any case, the proportion is undesirably and unnecessarily high. Compared to this certain fact, the actual figures are of only academic interest. If we wished to obtain a really reliable estimate of the number of unproductive marriages the only way would be to get the particulars of at least 1,000 marriages, in which the wife was under 35 and the husband under 40 at the time of marriage, and married life had lasted at least 15 years. But even these figures would not tell us the proportion of sterile *women* in the community, because in a number of cases the husband would be at fault.

2. The Responsibility of the Male Partner.

This brings me to the second general question. It is not sufficiently realised that in many cases the woman is not at fault. Estimates again vary widely as to the proportion of cases in which the husband is to blame; Court placed it at 10 per cent., Duncan at 12 per cent.; Brothers at 20 per cent. (based on 250 cases); Engelmann at 25 per cent.; Hühner at 41 per cent. (186 cases); and Noeggerath at 90 per cent. Noeggerath was apparently obsessed by the idea that gonorrhœa was the one important factor in the causation of sterility; and both he and Engelmann include under man's responsibility all cases of disease in the female which are directly traceable to the male. It is no doubt morally justifiable to blame the man who has made his wife sterile by giving her gonorrhœa; but from the point of view of statistics it leads to fallacious results. For while the woman whose tubes have been destroyed by gonorrhœa is permanently sterile, the man who infected her may remain quite capable of procreating children. But again, the actual figures do not greatly matter; what does matter is that we should appreciate the fact that in a childless marriage the woman may not be at fault, because it has an important practical corollary which is this: that in doubtful cases the wife should not be assumed to be responsible and submitted to operative procedures without obtaining definite evidence that the husband is healthy.

3. Inevitable and Incurable Sterility in Women.

It will make it all the easier to recognise the cases of incurable sterility if we bear in mind the conditions necessary for successful impregnation. They are:—

(a) *On the man's part.*—Ability to deposit healthy seminal fluid in contact with the os externum cervicis.

(b) *On the woman's part.*—(1) Ability to receive this fluid in contact with the cervix.

(2) Such a healthy condition of uterus tubes and ovaries as will enable the spermatozoa to travel up to meet the ovum.

(3) The production and discharge of healthy ova.

(4) Such a healthy condition of the uterus as will enable it to harbour the fertilised ovum.

We have to consider here only the woman's side of the question.

(1) Under the first heading the conditions that cause sterility are absence of the vagina and want of communication between the vagina and the uterus. When investigating a case it is not sufficient to accept a patient's statement that intercourse takes place: that may be so, and yet we find that the vagina ends blindly in a *cul-de-sac*. In such a case the woman has never menstruated, and this would at once put us on our guard against overlooking the condition. Three striking illustrative cases occur to me, in which intercourse was said to be normal and yet the vagina was closed above.

A case of androgyny, the patient living as a married woman. This case is related in my monograph. (Case 22, page 68).

[1]*A case of absence of the uterus with well-formed vagina, and double ovarian tumour.*

[1]*A case of uterus bicornis with undeveloped cervix separated by connective tissue from a closed but fairly developed vagina.*

Atresia of the vaginal orifice, such as occurs with retained menses, naturally prevents intercourse; but it does not come under the category that we are considering, because it is not incurable. We shall refer to it again later.

When the lower end of the vagina is closed and the upper end is patent, it is not always possible to tell whether it is merely a case of a septum across an otherwise developed vagina, or whether the upper part of the vagina is absent. It may be necessary to undertake a dissection of the parts before this point can be cleared up. When the vagina is absent, the question may arise whether an artificial one should be made. From the point of view of our present subject, sterility, I should say that the procedure would be quite hopeless. Whether it should be done in order to make married life possible is another matter. It is a very difficult thing to do, and in some cases repeated operations have been undertaken to make and maintain a patulous artificial vagina. Ingenuity, to my mind misplaced, has been exercised in the form of bringing down a

1. I propose shortly to report these two cases in full.

portion of the colon for the purpose. If the tube, when made, does not lead to a uterus, what is the use of it all? Nature has at least provided another channel that can be used, if a perverted and unnatural sexual act is the only object.

(2) The second condition for impregnation is such a healthy condition of the uterus, tubes and ovaries as will allow of the meeting of the spermatozoa with the ovum. This condition is unfulfilled in the case of absence or marked under-development of the uterus, congenital atresia of the tubes, and occlusion of the tubal channel by inflammation. Pyosalpinx, which is due to gonorrhœa in about 95 per cent. of cases and to tuberculosis or bacillus coli infection in the remaining 5 per cent., certainly causes incurable sterility. Whether a tube that has become occluded by mild salpingitis can be made functional by surgical means is a doubtful question, to which I shall make further reference.

(3) We know that for conception to be possible the ovary must produce healthy ova; but it is very difficult to say when it is not doing so. We know that age and the action of X-rays lead to ovarian atrophy; and we may presume that when this atrophy has come about ovulation ceases. But there are other conditions that apparently interfere with normal ovulation: for example, anæmia, chronic taking of drugs such as morphia, certain febrile conditions and some nerve-conditions, including pituitary disease. Obesity may come into this category: certainly obesity and sterility are related; but whether obesity is the cause of the sterility, or whether they are both the results of some disturbed metabolic process, we do not know. Nor do we know what are the factors that disturb normal ovulation or what is the influence, if any, of internal secretions on ovulation. If any product of internal secretion does play a part, we should expect that it is not the ovarian secretion, which is probably a product of ovulation rather than a causal factor in the process.

It would not be unreasonable to assume that the physical and chemical causes of defective ovulation act by interfering with the nutrition of the germ cells. Further researches on the internal secretions may shed some light on this very obscure and difficult subject.

(4) The fourth condition is not strictly one upon which successful impregnation depends, since failure thereon leads to miscarriage, not to sterility. But it is conveniently included here, because when patients consult us they are not so much concerned in the possibilities of conception as in the chances of having a living child. From this point of view the cases that we must regard as hopeless and incurable are those of uterine tuberculosis, carcinoma and

sarcoma of the body of the uterus and uterine fibrosis. In the last-named condition. the absence of the mucosa renders impossible what has been described as the "nidation of the ovum."

4. Functional Sterility.

When a childless woman who has been married for some years gives a history of regular menstruation without undue loss or unusual pain, and, on examination, the pelvic organs appear to be normal, we may regard the case as one of functional sterility. There are then several possibilities to be considered. In the first place, complete intercourse may not have taken place, and this may have been due to impotence on the man's part or to nervousness and shyness on the woman's part; or because the first attempt was painful the woman has been too fearful to try again, or the man has refrained lest he should seem unkind; or both young people have been obsessed with a morbid fear that a confinement would necessarily be fatal, such ideas being fostered by a certain type of sensational fiction in which the novelist always arranges for the heroine to die after an apparently natural child-birth. One patient, who had been married twenty-six years, told me that when she was married the period was on, and this seemed to have put her husband off, and she "had never had any provocation since." Secondly, it may be one of those cases where the husband is at fault, suffering from azöspermia or from a deficient vitality of spermatozoa, and this point may require investigation. Thirdly, it may be an instance of "sexual incompatibility." We know that there are cases in which a husband and wife have been unable to effect a conception together, and yet each has been fertile with a different mate. The reason is not known, and we do not even know whether this defect is psychological or physiological. There is certainly nothing that the medical attendant can do in the presence of this difficulty.

5. Conditions that Cause or Favour Sterility but Allow of Treatment.

We come now to the more hopeful side of our subject. It will be convenient to keep to the same classification that we used before.

(1) *Conditions that Prevent Normal Intercourse.*

Atresia of the Vaginal Orifice.—This is a curable condition, but the prognosis as regards sterility will depend on the stage at which treatment is undertaken. If menstruation has been going on for some time and its products accumulating in the closed vagina, secondary changes may be set up in the mucosa of the uterus, and

later in the tubes, which may be inimical to conception. But if the patency of the vagina is established early there is a good prospect of fertility.

Stenosis of the Vagina and Rigidity of the Hymen.—Dilatation of the vaginal orifice under anæsthesia by means of the fingers or with graduated specula is often sufficient. In more pronounced cases of stenosis the vaginal wall should be incised vertically, and the resulting wound sewn up transversely. The prognosis is very good.

Dyspareunia and Vaginismus.—The source of pain during intercourse should be sought; it is most frequently in the neighbourhood of the vaginal orifice and the remedy is usually simple. More deeply-seated pain may be due to a prolapsed ovary or some inflammatory condition of the appendages and abdominal operation may be needed. Inflammatory disease will, of course, require treatment on its own account, apart from the question of sterility; but a prolapsed ovary can be sutured up; and if associated with retroversion, the fixing of the uterus in place is often sufficient to lift the ovary out of the painful zone. Vaginismus is more difficult to treat; but even here a good dilatation of the vaginal orifice under anæsthesia will often help matters, and the rest will depend mainly on the persuasive powers of a judicious husband. It is a condition in which suggestion might play a useful part. Once the mechanical difficulty is overcome, the prognosis as regards sterility is good, as long as the patient has not waited until she is handicapped by the factor of age.

Tumours Encroaching on the Vagina.—An ovarian tumour or a uterine fibroid situated in the pelvis may cause a mechanical obstacle to intercourse.

The treatment is, of course, surgical, and the prognosis will depend on the possibility of leaving at least one ovary and a not too much damaged uterus. I have not wished to expand these remarks by the narration of cases, and shall be sparing of them. The following is worth mentioning: I saw the patient, aged thirty-six, when she had been married two months. She sought advice on account of difficulty with intercourse, and on examination the vagina was found encroached upon and apparently shortened by a large fibroid in the posterior wall of the uterus, pressing down the pouch of Douglas. I did a myomectomy and hysteropexy; she became pregnant three months later and had a normal confinement on the anniversary of her operation.

Prolapse and Procidentia.—Inasmuch as these conditions are usually the sequel of child-bearing they are the cause of secondary rather than of primary sterility. The obstacle to intercourse is

mechanical, and treatment allows us to give a good prognosis. When pregnancy is greatly desired I consider that operation is much better than pessary treatment; for the latter is apt to defeat the object by setting up of noxious discharges. I have many records of pregnancy and normal confinement following hysteropexy for prolapse and procidentia.

(2) *Conditions that Allow Intercourse but Interfere with Ascent of Spermatozoa.*

Under-development of the Uterus.—In this condition the prognosis depends mainly on the patient's age; if she is not much over twenty years of age it may be an instance of delayed rather than of arrested development. This is sufficiently rare to warrant the narration of an example. In the summer of 1911 I saw a girl, aged nineteen. She had had amenorrhœa for a year and a half, and had previously menstruated slightly for a few months. Examination under anæsthesia showed a markedly under-developed uterus; it felt small and the sound passed in $1\frac{3}{4}$ inches. I saw her again five years later. Menstruation had been going on regularly for two years; the menstrual flow not very much, but lasting three to four days. She had been married six months. On examination the uterus felt quite normal in size. In quoting this case in my monograph I added, "I shall not be surprised if pregnancy occurs." This forecast has proved correct and my colleague, Dr. Ellison, is expected to confine her within the next few weeks. Kisch has related a similar case. Obviously one need not give a hopeless prognosis in such cases, but it must be borne in mind that most of the cases that we see of under-development are really arrested development; and I know of no treatment that will remedy the defect.

Anteflexion of the Uterus and Stenosis of the External Os.—These conditions are frequently, but not necessarily, found together; and there is no doubt that the presence of either one or both of them must be regarded as very unfavourable to conception. But we cannot say that conception is impossible. From the point of view of prognosis following treatment, these are among the most satisfactory cases that we meet; for if a proper dilatation of the cervical canal be carried out, and especially if this be followed by the insertion of an intra-uterine stem for a fortnight, the chances of subsequent pregnancy are very good. I have met with a number of instances of this.

Retroversion of the Uterus.—This is another condition which must be considered as unfavourable to conception. but not as definitely preventing it. Retroversion of the gravid uterus is not rare, and there is no doubt that in many of the cases the displace-

ment has preceded the pregnancy. On the other hand, one meets with a fair number of cases in which a patient who has had several years of sterile married life is found to be suffering from retroversion; and on correcting this, either with the help of pessaries or by operative means, pregnancy follows. One cannot lay down a general rule as to whether surgical or other treatment should be adopted, and it would take too long to discuss the matter now. Each case must be dealt with according to all the circumstances attending it.

Atresia of the Os Externum.—Here prognosis is hopeless without treatment and not very good with it. As a rule such atresia is the result of inflammatory conditions, which are likely to have other bad effects on the uterus besides closing its orifice. Nevertheless, an attempt should be made to restore the patency of the canal.

Polypus in the Uterine Canal.—Under this heading we may include fibroid and mucous polypi and submucous fibroid. In nearly every case the condition can be cured; the operation may be very simple, amounting to little more than a curetting, or it may be a big affair, namely, an abdominal myomectomy by hysterotomy (that is, the removal of a fibroid from inside the uterus by the abdominal route). Prognosis ranges from "very good" in the case of small polypi to "moderate" or even "bad" in the case of large intra-uterine fibroids.

Salpingitis.—It is nearly certain that in cases of mild salpingitis without occlusion of the tubal ostia, conception can take place; and in all probability the sequel is often a tubal pregnancy. We may suppose, however, that uterine pregnancy also follows; for we are all familiar with cases in which child-bed fever is apparently due to the lighting up of a latent infection of the tubes. But such a condition can hardly be diagnosed before operation, and so the question of prognosis hardly comes in.

There is another condition to be considered—namely, *Salpingitis with Occlusion.* Obviously, when this is present conception is impossible; but within certain limits it can be remedied by operation—namely, in those cases in which there has not been extensive suppuration or damage to the tubes. An artificial ostium can be made by making an incision in the tube, near the ovary, and oversewing the edges, to prevent the opening from closing up again. A good deal of this conservative surgery has been done, and some successful cases have been reported in which pregnancy has followed. I have done it myself in a few cases, but I have not heard of any of my patients having become pregnant. The prognosis should be very guarded, because, although we may count

on restoring patency, we cannot tell how far the damage to the tubal mucosa may vitiate the chances of pregnancy.

There are certain methods of treatment that have a place when the cause of sterility lies with the man. Thus a vaso-vasostomy has been carried out when the vasa deferentia are occluded and there is evidence of live spermatozoa in the testicle; and in cases of male impotence, when the semen is normal, artificial insemination has been tried. I have not gone into these questions, as my observations are more particularly concerned with sterility in women.

I have endeavoured, in this short résumé, to outline the principles that will help us in giving a prognosis as to the prospects of child-bearing, and the treatment that should be carried out in those cases that offer a chance of improving those prospects. In conclusion, I should like to emphasise three points:—

(1) The possibility of the responsibility of the husband must always be borne in mind.

(2) It is unwise to promise a successful issue as the result of treatment; for though we may secure correct anatomical conditions, we cannot control their physiological working.

(3) The idea that every sterile woman should be curetted ought to be discouraged. In fact, no operation on a woman should be undertaken unless we are reasonably satisfied that her husband is all right.

The End Results of Vaginal Operations for Genital Prolapse.

By Professor W. E. FOTHERGILL, M.A., B.Sc., M.D.(Edin.),

Honorary Gynæcological Surgeon, Manchester Royal Infirmary; Honorary Surgeon, St. Mary's Hospitals for Women, Manchester.

THIS discussion originated at a meeting of the North of England Society, held at Liverpool in December 1918. Professor H. Briggs described the treatment of a case of procidentia in a patient, aged 18, by a vaginal operation combined with ventro-fixation. W. Blair Bell deprecated ventro-fixation, but advocated a modification of Gilliam's operation. W. F. Shaw deprecated abdominal operations for prolapse, preferring the vaginal methods used in Manchester. Other members urged that the end results of these measures should be ascertained and published, and a collective investigation by the Society was suggested. At subsequent meetings this project was developed and the scope of enquiry came in question. It was proposed to exclude all except cases of complete prolapse, but this was not thought feasible. The term "genital prolapse" has a fairly definite connotation all over the world; and medical men constantly use the word "prolapse" as including both so-called vagino-uterine prolapse and so-called utero-vaginal prolapse. In view of these considerations, it was decided at a Council Meeting of the North of England Society in December 1919, that the enquiry should include "cases of (1) cystocele, (2) rectocele, (3) prolapsus uteri, and (4) elongated cervix protruding from the vulva," namely, in two words, cases of genital prolapse. At an ordinary meeting of the Society in Liverpool in October 1920, F. H. Lacey gave a preliminary report on traced cases operated on at St. Mary's Hospital, Manchester, during the years 1914–15–16. Subsequently it was arranged to defer the further consideration of the subject to this meeting.

I will briefly indicate the steps by which I was led to the technique I now use, and will give a few figures which indicate the nature of the results secured by it after the lapse of years and under the stress of parturition. I saw some vaginal surgery in Edinburgh in the years 1890–95, under the late Sir A. R. Simpson and the late David Berry Hart. Clarence Webster was then assistant to Simpson, and he returned from a visit to Martin, of Berlin, bringing back certain special instruments, which some of you may remember, designed to facilitate the performance of colporrhaphies. The

measures then used in Edinburgh were anterior and posterior colporrhaphies of moderate size, amputation of the cervix and repair of the perineum. These were done as separate operations, and, in some caes, all four were used for one patient. Chromic catgut was the suture material, the immediate results were good; of the end results I know nothing.

When I came to Manchester in 1895 I found that, owing to the initiative of my senior colleague, Professor A. Donald, the surgical treatment of genital prolapse was already highly evolved and most efficient. The anterior colporrhaphy incisions were larger than those I had seen, and the whole thickness of the vaginal wall was removed, not merely a superficial layer. Donald had also brilliantly combined the operation of posterior colporrhaphy and perineorrhaphy in a single operation done from above downwards. This was a great simplification and advance in the treatment of rectocele. For the last thirty years Donald has operated in Hospital four days a week and has cured an enormous number of cases of prolapse by amputation of the cervix, extensive anterior colporrhaphy and his own colpo-perineorrhaphy.

My own contributions to the surgery of prolapse were made at a much later date. Clinical experience gradually taught me that the uterus, vagina and bladder are mainly kept in their places by the lateral combinations of unstriped muscle and connective-tissue known as the parametrium and the paracolpos. Finding that several anatomists had come to the same conclusion, I brought their names and their work before the Royal Society of Medicine in December, 1907. The facts then mentioned have been re-discovered subsequently with surprising frequency in various parts of the world. The practical application of this was that anterior colporrhaphy could best be improved by carrying the incision well up and out on either side of the cervix, fully exposing the paracolpos so that closure of the wound must bring together in front of the cervix structures which were formerly at its sides. This modification of technique I advocated before the Edinburgh Obstetrical Society in 1908. (See *Transactions*, 1907–8.)

Subsequently, I found that by carrying the colporrhaphy incision round behind the cervix instead of in front of it, anterior colporrhapy and amputation of the cervix could be conveniently combined in a single operation instead of being done separately and seriatim. This not only saved time and trouble, but fully exposed the parametrium as well as the paracolpos. When the wound is closed, the stump of the cervix passes upwards and backwards so far that the uterus is left in a position of anteversion. This dispenses with the need for exaggerated narrowing of the vagina, a gain of some importance with a view to subsequent coitus

and parturition. After an extended experimental period, this combined operation was demonstrated to graduates at the Manchester Royal Infirmary in March 1913, and published in the *British Medical Journal* (April 12, 1913). An improved technique was described and figured in the *American Journal of Surgery* (May 1915) and in the *Journal of Obstetrics and Gynæcology of the British Empire* at the same time (March–May 1915).

I cannot say how often I have used these two modifications of technique at St. Mary's Hospitals, at the Manchester Royal Infirmary and in private. But, thanks to F. H. Lacey, I can give some figures relating to my cases treated at St. Mary's in 1914–15–16. Since these operations were done, periods varying from $4\frac{1}{2}$ to $7\frac{1}{2}$ years have elapsed. Whenever rectocele was present Donald's colpo-perineorrhaphy was used, the anterior vaginal wall and cervix being dealt with according to the modified technique I have mentioned.

The number of my patients who replied to Lacey's letter of enquiry is 156. Of these, 150 state without qualification that they are cured, while 6 do not.

(1) Three children since the operation and the womb has come down again.

(2) "The womb is not as it should be." On examination she had no prolapsus. She is at the menopause.

(3) Her doctor reports that this patient has had no chance owing to chronic cough and asthma. This was a case of rectocele only.

(4) Was found on examination to have some vaginal prolapse, the uterus being in good position.

(5) A case of rectocele only; had an instrumental confinement, and was badly torn, with slight recurrence of rectocele later.

(6) "The womb is painful at times." Examination shows no recurrence of prolapse.

Thus two out of the six are found, on examination, to be anatomically free from prolapse. Adding these 2 to the 150 who say they are cured, the result is 152 successful operations out of 156, namely, 97 per cent. As to the ages of the patients, about one-third of these had passed the menopause.

27	were between the ages of			21	and	30	years.
59	„	„	„	31	„	40	„
41	„	„	„	41	„	50	„
19	„	„	„	51	„	60	„
3	„	„	„	61	„	70	„
149							

The ages of the other seven patients are not recorded. I have operated on several patients over 70 and under 20 but not in this series.

The combined amputation of the cervix with anterior colporrhaphy was performed in 124 cases, the cervix being retained in the remainder, a few of which required no anterior operation but only colpo-perineorrhaphy for rectocele. No case of mere perineal repair is included. An interesting point is that 32 cases were examples of elongated cervix with inversion of the vaginal walls from above downwards. This is the only variety of prolapse which occurred in nulliparous women.

I formerly thought that an operation for prolapse should prevent recurrence even if the patient had one or more subsequent confinements. But we must remember that the arrangements which nature has provided for the support of the pelvic viscera do not by any means always stand the test of pregnancy and labour. To expect from the surgeon arrangements superior to those designed by Almighty Providence, in cases in which these have already failed, is surely asking too much. All we can demand is that the new pelvic floor shall be as good as the original one and a little better if possible. From this point of view the following figures are of interest. Since their operations 21 of the women under 40 and 3 of those over 40 have had children, and 2 others are now pregnant. Thus 26 of the women of reproductive age have conceived subsequently to operation. Of these 26, no less than 23 had the cervix removed by the combined operation. Thus this operation has failed to prevent pregnancy in nearly a quarter of the women of reproductive age.

Thirty children have been born to the 24 patients; of the 30 labours, 23 were natural and 7 were instrumental, but in no case was labour obstructed. Four patients have had two labours each with no recurrence; 17 patients have had one labour each with no recurrence; one patient had one labour, and was badly torn, with recurrence of rectocele not requiring treatment; another had one labour, and says the womb falls slightly when she is tired, but does not require further treatment. Another has had three labours, and there is recurrence which should be treated by another operation. Thus prolapse sufficient to cause inconvenience has only returned in one case out of 24.

I think it must be allowed that vaginal operations afford, for all varieties of prolapse, treatment that is efficient and permanent, that does not prevent pregnancy and that stands the test of parturition in a large proportion of cases.

This being so, it follows that the addition to these vaginal operations of any abdominal intervention is unnecessary and there-

fore undesirable. It involves trouble and loss of time to the operator and adds to the risk and discomfort to which the patient is exposed. I must say with regret that I once, many years ago, lost a patient after a vaginal operation. She died of pneumonia. Others may have had similar experiences, but it cannot be denied that the risk is increased whenever an abdominal section is done in addition to an extensive vaginal operation. To put this in another way, the family medical adviser will not send his cases of prolapse to specialists who cannot cure them without opening their abdomens, when he knows that there are others who cure their cases with monotonous regularity by the vaginal route alone. This is one reason for avoiding abdominal operations in the treatment of prolapse. But there is another and even more serious one. For many men are still using these measures *not in addition to but instead of* vaginal surgery, with inevitable disappointment as the result. It is not to the credit of the profession that women should go home with their cervices still projecting at the vulval cleft after having undergone the risk, discomfort and expense of futile ventrofixations at the hands of those who have never attempted to learn vaginal surgery.

A Short History of the Operation of Colporrhaphy, with Remarks on the Technique.

By Professor Archibald Donald, D.L., M.D., C.M. (Edin.), F.R.C.P. (Lond.).

Consulting Gynæcological Surgeon, Manchester Royal Infirmary; Honorary Surgeon, St. Mary's Hospitals, Manchester.

It has occurred to me that it might be of interest in the discussion of the operations for prolapse of the uterus if I gave a short account of the history of colporrhaphy in Manchester.

I believe that colporrhaphy in the proper sense of the word has been more frequently done in Manchester than in any other town in this country, and as the oldest member of the present staff at St. Mary's Hospital I can speak of the earlier days of the operation.

When I was Resident Surgical Officer to St. Mary's Hospital during the years 1884–87 I was much struck by the numbers of women who came to the out-patients' department suffering from the more serious degrees of prolapse. The treatment of these cases was practically confined to the insertion of pessaries, some of them of enormous size. The patients attended the out-patients' room at regular intervals of a month to have their pessaries seen to. The condition seemed to me to be one in which operative treatment on lines similar to what was employed in cases of hernia ought to be possible and successful. When I was appointed surgeon to the Hospital in 1888, and had beds at my disposal, I put this theory into practice. There was little to encourage one in the records or in the literature of the subject. I was told by my senior colleagues that failure always resulted from any attempt to cure prolapse by means of a plastic operation on the vagina. It is true that one had read accounts of operations done in America and Germany, but the English text-books either made no mention of these or referred to them in a way which was not calculated to encourage anyone to attempt them. The standard book on gynæcology at that time was that of Hart and Barbour, and this gave a very full account of operative measures. But it summed up the matter in recommending as treatment for prolapse—

(1) the use of a ring in slight cases;

(2) episioperineorraphy (which was a glorified perineorrhaphy) or elytrorraphy (or colporrhaphy), anterior and posterior, and a pessary in medium cases; and

(3) Le Fort's or Neugebauer's method in advanced cases.

As regards No. 2, it stated that "this is a frequent operation with many, and helps at least by enabling the patient to wear a ring pessary." The operations of Le Fort and Neugebauer consisted in removing two strips off each wall and uniting the opposing raw surfaces, thus dividing the vagina anterior-posteriorly into two. I never heard of anyone attempting either of these operations. In fact, when I commenced my operations, I knew of no one who was doing them or who could help me in the matter.

At that time it was still the custom to use silkworm gut or silver wire in the treatment of lacerated perineum, although catgut was beginning to be used abroad. My first operation was undertaken on July 28th, 1888, for a large cystocele in a woman aged 48. A diamond-shaped strip of vaginal mucous membrane was removed from the anterior vaginal wall, and the raw surface was brought together by a spiral of continuous catgut in *étages*, as it was then called; in other words, the raw surface was closed in layers, the deeper layers were buried, and the mucous membrane was united over the top.

In case No. 2, on July 30th, 1888, the cervix was amputated as the first stage, and silver wire was used to bring the cervical flaps together. (This was the last occasion in which I used silver wire for the cervix.) Then anterior and posterior colporrhaphy followed. The raw surface was diamond-shaped on the anterior vaginal wall, and was stitched with catgut, continuous and buried. On the posterior surface a triangle was mapped out with the apex close to the cervix, and the base at the junction of skin and mucous membrane, the sides of the triangle diverged so that at the base they reached the middle of the labium minus of each side. After the operation the vagina only admitted one finger. The posterior colporrhaphy was done in stages from above downwards, the triangular flap being separated from its apex for about an inch, and then the sides brought together before the incisions were carried lower down. Buried continuous catgut was used for the deep stitches.

My third operation was on September 19th, 1888, and was for complete procidentia. The cervix was not amputated, otherwise the operation was as in No. 2.

I have still the notes of these three cases performed in 1888, but there were three or four others concerning which no details are noted. I continued these operations on much the same lines during 1889–1890. In most of the cases which were undertaken for well-marked prolapse the cervix was amputated, and anterior and posterior colporrhaphy done in all. The healing was not good in these days, partly I think because the catgut was not so reliable and came away at an earlier date, and as a result there was still

some tendency to prolapse in some of the cases, but most of them satisfied the condition laid down by Hart and Barbour and enabled a ring pessary to be retained.

In March 1891 I operated on a very bad case of procidentia in which an ulcerated mass protruded from the vulva and could not be reduced until the patient had been kept in bed for two weeks. The vagina in this case was so narrow after the operation that it was quite impossible to introduce a pessary. I saw her a year after the operation and the uterus was high up and no pessary was employed.

I operated in a similar case in the following April, and this patient was kept in bed for three weeks before the operation. I saw her three and a half years later; the vagina was well contracted and she was wearing no pessary in spite of the fact that she had worked hard as a charwoman and was subject to chronic bronchitis.

These two cases finally established in my mind a belief in the value of colporrhaphy, but for three or four years after this date I turned my attention to the operations for the suspension and fixation of the uterus through the abdomen. I never felt satisfied with these in cases of prolapse, and I returned again to the vaginal operations which I had never entirely discarded. For a time I practised vaginal fixation as part of the vaginal operation, but this was abandoned after a few years.

The number of colporrhapy operations at St. Mary's Hospital was greatly increased with changes in the staff. The late Dr. Wall, and Drs. Fothergill, Clifford and Fletcher Shaw have all given practical proof of their faith in the operations as a curative measure.

Technique.

I have given a resumé of the method of operation in my early career, and that method, with certain modifications, resembles my present practice. In 1908 I published a short description of the operations for complete prolapse of the uterus, but at that time I had given up using the buried continuous suture in the anterior and posterior walls. Of late years I have come to regard the buried sutures as one of the most important points in the operation, but instead of a continuous spiral suture I have used the continuous blanket stitch in the deep tissues. This gives closer apposition and a better control of hæmorrhage. More recently I made use of the Reverdin needle which enables one to work more rapidly. If one uses this needle and has the help of a trained assistant the whole operation (amputation of cervix, anterior colporrhaphy and posterior colpo-perineorrhaphy) can be completed in thirty minutes.

I practised many modifications of the operation, sometimes making the anterior colporrhaphy the main feature and sometimes the posterior. But one cannot have a very extensive operation on both walls, and every case has to be considered on its merits. As a rule, when cystocele is not the main feature, I regard the building up of a firm posterior wall as the important point. What one must recognise, if one is to have any success in the operations, is that the raw surface, anterior or posterior, or in exceptional cases both, must be high, wide and deep, and that the deep tissues, triangular ligament or levator ani muscles, must be brought together by deep buried stitches.

Finally, I wish to record my opinion that there is no operation in which one can guarantee with more confidence a good result than colporrhaphy for vaginal and uterine prolapse.

Results of Vaginal Operations for Prolapse by the Manchester School.

By F. H. Lacey, M.D., Ch.B. (Manc.),

Hon. Assistant Surgeon, St. Mary's Hospitals, Manchester.

At a meeting of the North of England Obstetrical and Gynæcological Society held during the war a discussion arose as to whether prolapse of the genital organs could be dealt with satisfactorily by operations *per vaginam*, and since the Manchester School were confident that their results justified such a conclusion, it was suggested that enquiries should be made to ascertain what these results were, and I was asked to investigate the matter by writing to patients of St. Mary's Hospitals.

I wrote to all patients who had been operated upon during $2\frac{1}{2}$ years of 1914, 1915, 1916. I chose these years as I wanted the results of the recent cases, provided that at least four years had elapsed, and the average is about six years.

Operations for repair of the ruptured perineum, whether complete or incomplete, if not asociated with prolapse, were not included. I should like to point out that the years chosen were not likely to give the best results as, like many others, the operators were during these years particularly busy, and if there was a tendency at any time to do the least that was thought necessary, then surely one might be at fault during this strenuous time.

The patients were women of the working class who in many cases were compelled to return to the cotton mill, munitions and other laborious work at a short interval after their return home from Hospital. I feel very confident that if the same operators would ascertain the results among their private patients, who are naturally better able to look after themselves during their convalescence, then the percentage of successful results would further be raised.

A letter was sent to 750 patients containing these questions:—

1. Does the womb keep up well now?
2. Have you had any confinements since the operation?
3. If so, how many, and when?
4. Did you need instruments at any of these confinements?
5. Has the womb come down at all after confinement since the operation?

If the reply was unfavourable and the patient had not called to see me, I wrote again asking the patient to attend if possible; but in many cases this meant the loss of a day's work, and in some cases a railway fare.

The results are based upon 521 cases from whom I received a reply. In many cases the patient had changed her address in the interval since the operation and I was unable to trace her.

Of the 521 patients who replied, 455 (87%) answered the first question in the affirmative.

I saw 29 of those who replied that it was not a success, and examined them; 17 of the 29 had some prolapse, although in many cases it was very slight, and in almost every case the patients said that their condition had been consideably improved by the operation. I saw only one case of procidentia, which was in a woman of 75 suffering from chronic bronchitis. Another had asthma and chronic bronchitis, and her medical adviser wrote to tell me that the operation had no chance at all. Another told me that she had to return to the cotton mill within two months of the operation. Two were delivered within 12 months of the operation. I saw two cases of elongated cervix causing symptoms, and in these the cervix should have been removed. The remaining 10 of the 29 seen had no prolapse, but were suffering from such conditions as cystitis, prolapsed kidney, hæmorrhoids and senile vaginitis. Twenty-one replied that their condition was considerably improved. Twenty-six replied that the operation had not been successful, and did not come to see me, and these I have considered as failures, although only 19 were failures of the 29 whom I saw. If one may assume that this percentage of success was the same in these two classes then the percentage would be raised to almost 90. The 21 who replied that they were improved I have considered failures as I have not counted any successes except those who replied that they were well, and the few I was able to examine and found cured.

It is interesting to divide the patients up into lists according to their ages and this has been done in decades:—

	Majority or cures.
Under 20, 1 case	100%
21—30, 75 cases	87%
31—40, 200 cases	89%
41—50, 108 cases	95%
51—60, 47 cases	89%
61—70, 21 cases	87%
75, 1 case	100%

Taking those of reproductive age, I find that 330 successes bore 67 children (20%), instruments 32%; 19 improved bore 6 children (31%), instruments 80%; 33 failures bore 16 children (48%), instruments 62%. So that both failures and improved show a higher ratio of labours and again a higher ratio of instrumental deliveries than successes. This is what one would anticipate, and it is obvious that one can scarcely expect a colporraphy or any other operation to stand the strain of parturition better than the normal and natural pelvic floor.

I should add that there was one death among the vaginal operations during this period. When one considers that many of the abdominal operations, in addition to the risks of sepsis, hernia, etc., during convalescence, frequently have a vaginal operation added to them, I am of the opinion that with results such as these it is unnecessary and superfluous to operate by the abdominal route.

A Short Review of Cases of Extra-uterine Pregnancy admitted to the Gynæcological Department, London Hospital, 1913 to 1920.

By Gordon Luker, M.D., B.C. (Cantab), F.R.C.S. (Edin.),

Assistant Obstetrician and Gynæcologist, London Hospital.

Two hundred and fifty-three cases of extra-uterine pregnancy were admitted to the Gynæcological Department of the London Hospital during the years 1913—1920, under the care of Dr. Russell Andrews, Mr. Eardley Holland and Mr. Gordon Luker. The age of the youngest patient was 18, and of the oldest 52; the latter being a case of secondary abdominal pregnancy, with death of the fœtus, some years previously.

Operation was performed in 240. In 148 of these the anatomical and clinical condition was placed in a special class, thus: *Acute rupture of the tube* was noted in 68 cases; *tubal mole* was found in 51 cases; *tubal abortion* occurred in 29 cases.

Of the 240 operations performed, 37, or 15 per cent., were special emergency operations in which the condition of the patient demanded immediate interference. The series includes six deaths—three from shock and hæmorrhage, one from pulmonary embolus, one from broncho-pneumonia, one from peritonitis. Of the first, one death occurred in a patient who was not operated upon, but collapsed and died suddenly some hours after admission to Hospital with a tentative diagnosis in the receiving room of "retroverted gravid uterus." Post-mortem, a large pelvic hæmatocele was found. Two other deaths from shock and collapse occurred within twelve hours of operation, and raised the question whether it is not advisable to delay operation in some cases in which shock is profound.

Rare conditions.—These include one case of old-standing ectopic gestation and three cases of pregnancy in a rudimentary horn.

In a more detailed examination of 42 cases which were admitted in the year 1920, the following points have been noted: In 30 per cent. no previous pregnancy had occurred. In those in whom previous pregnancy had occurred the number of children was variable, though rarely more than four. In one patient, however, 10 children

were noted. Some considerable period of sterility had generally elapsed since the last confinement. Abortion does not seem to hold any prominent place in the ætiology of the condition. There were two cases of repeated tubal pregnancy. Inflammation in the pelvis or other tube was definitely noted in 11 cases.

Symptoms.—In 28 cases, i.e., 66 per cent., the ordinary history of amenorrhœa was obtained. In 10 cases a period had not been missed; that is to say, bleeding occurred at or within a month from the last menstrual period. In four cases there was no bleeding at all up to the time of operation. This, in our opinion, is rare, and indicates an atypical condition; in one of these cases, for instance, the abdomen was full of blood which had come from a ruptured Graafian follicle. No evidence of pregnancy in the tube or ovary could be found. Apart from this, it seems probable that, when no bleeding from the uterus occurs, the ovum is still living.

Pain.—In nearly half the cases acute pain occurred as the first symptom. In another 16 per cent., pain was the first symptom but was not really acute. In several cases a dull "girdle" pain was complained of, and was found to be of some value in assisting diagnosis in a doubtful case.

Bleeding.—There was some bleeding from the uterus in all but four cases. In about half the cases bleeding did not occur until after the first attack of pain. In more than one-third of the cases, however, bleeding was the first symptom. Thus it seems fair to conclude that typical symptoms of acute pain, followed by a small amount of bleeding, are by no means constant.

Decidual Cast of the Uterus.—This remains the pathognomonic sign of extra-uterine pregnancy, and when care is taken to keep everything that is passed *per vaginam* from the onset of the symptoms, a decidual cast can be found in whole or part in nearly half the cases; it is shed more often after than before operation.

The differential diagnosis from salpingitis, a small ovarian cyst and appendicitis is often difficult. The pulse-rate is the most useful guide, and if charted hourly will prevent any delay in operation which may be injurious to the patient. Any considerable rise of temperature points to an inflammatory condition rather than to extra-uterine pregnancy. In salpingitis the presence of a vaginal discharge, and in appendicitis any symptoms pointing to an intestinal affection, are the most salient points in differential diagnosis.

Extra-Uterine Pregnancy.

(Gynæcological Department, the London Hospital.)

Year.	Total Number of Cases.	Age. Y. and O.		Tubal Mole.	Acute Rupture.	Tubal Abortion	Operation. Emergency.	Ordinary.	Nil.	Death.
1913	35	21	45	18	6	3	3	28	2	0
1914	33	18	52	4	7	—	7	24	2	0
1915	31	23	42	4	16	6	—	30	1	0
1916	18	19	41	5	3	1	—	17	1	0
1917	35	24	42	5	12	7	—	32	3	0
1918	24	21	41	6	1	4	4	20	—	1
1919	35	21	40	2	8	2	8	24	2	0
1920	42	22	47	7	15	6	15	28	2	5
Total	253	18	52	51	68	29	37	203	13	6

Rare Conditions:—

1 Full-time Ectopic Gestation.
2 Left Rudimentary Horn.
1 Right Rudimentary Horn.

Deaths—6, include:—

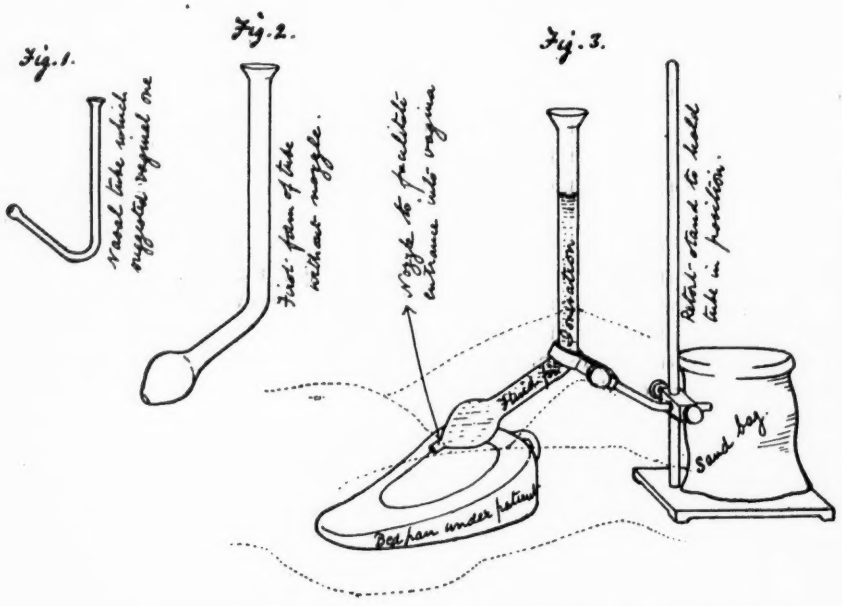
2 Shock and Collapse from Hæmorrhage (after operation).
1 Shock and Collapse from Hæmorrhage (no operation).
1 Pulmonary Embolus.
1 Broncho-pneumonia.
1 Peritonitis.

Ionisation in the Treatment of Certain Gynæcological Ailments.

By J. SANDISON CRABBE, L.R.C.P., L.R.C.S. (Edin.), (Birmingham).

I PROPOSE to bring to your notice an improved method of treating some diseased conditions of the uterus and adnexa by electricity.

For many years French and American practitioners have used a variety of currents for treating these complaints and with good results. Apostoli treated fibroids with the galvanic current, and Bordier treated the same disease with X rays.



American practitioners favour static current for a great variety of uterine complaints of a congestive and spasmodic nature. The late Dr. Sloan of Glasgow, an earnest worker, varied the kind of current he used according to circumstances. I wish to discuss the use of the galvanic current in its action of ionisation and electrolysis. I got the idea for the apparatus I have devised, for carrying drugs into the parts affected with disease, from a U-shaped glass

nasal tube which is used for treating nasal catarrh (see Fig. 1). I had a larger one made for use in the vagina. Fig. 2 gives an idea of the shape of the first tube used for treatment. It is made of glass tubing one inch in diameter. The top is spun out to form a funnel two and a half inches across. The shaft, which is fourteen inches long to the angle and six inches to the bulb, spreads out to a diameter of two and a half inches, and ends in a hole three-quarters of an inch across. The angle is an obtuse one of one hundred and thirty-five degrees. In Fig. 3 it will be observed that there is a nozzle added to the orifice of the bulb, which makes the insertion easier and also keeps the vaginal wall away from the lumen of the tube.

The patient is placed on her back on a couch. A slipper bed pan placed underneath the buttocks raises the pelvis slightly, and collects the solution when the tube is withdrawn. The ball is vaselined and then pushed gently into the vagina till it fits fairly tightly. An adjustable retort-stand with a heavy base is then placed so as to allow the clamp to grip the tube and keep it in the position most comfortable to the patient. A bag of sand on the base holds the stand firm. After putting a pad wet with normal saline on the abdomen and a metal electrode over it, some of the solution to be used is poured into the glass tube. If the patient does not feel any leakage when the tube is partly full, the rest of the fluid, usually about twenty ounces, is poured in till there is a head of fluid in the tube about twelve inches high. The patient is then asked to cough. This often expels a large bubble of air imprisoned in the vagina, which if retained would insulate a part of its surface from the current. It also indicates whether the end of the tube is free in the vaginal cavity, or pressing against some part of the wall. This frequently happened when the first tube (see Fig. 2) was used, and a sore spot developed by the current impinging on the part opposite the hole in the tube. With the improved tube the weight of fluid balloons the vagina and keeps the wall away from the nozzle and at the same time smoothes out the vaginal rugæ so that the fluid bathes every part of it, which is especially necessary when treating a septic vaginitis. If when the patient coughs the fluid does not rise in the tube it shows that the tube is improperly inserted. If this cannot be rectified without losing much of the solution, it is best to remove the tube and then reinsert it. When all is in order a copper or zinc wire is placed in the solution in the tube corresponding to the reagent used in treatment. The solutions most frequently used in treating uterine, cervical and vaginal conditions, are zinc sulphate and copper sulphate (1 per cent.).

In cases of salpingitis a solution of potassium iodide, 1 per cent.,

with some tincture of iodine added till the colour corresponds to sherry, is the most satisfactory. The ion of iodine is the most penetrative of all, and travels into the tissues a long way in a short time. When everything is ready, the polarity of the current is determined; and if the solution to be used is one of copper, zinc or mercury, the wire in the tube is connected to the + pole; if potassium iodide and iodine the − pole. The current is now slowly turned on till about fifty mil. amps. are registered. The patient's sensation of pricking in the vagina and on the abdomen must be taken as a guide in regulating the dose of current. The vaginal membrane is very insensitive and will easily stand fifty mil. amps. The occurrence of abdominal pain when the current is turned on is a diagnostic sign of encysted pus, and if it occurs the ionization should at once be discontinued. The length of the interval between applications it depends on the reaction caused, which varies considerably. In some the applications are once a week; in most cases they can be given at three day intervals. Copper always causes more reaction than either zinc or iodine.

The following are illustrative cases:—

CASE 1.

Case of salpingitis. Mrs. A. (Dr. Good). Right salpingitis and ovaritis with some chronic appendicitis, also anterior crural neuritis. Dysmenorrhœa. Some menorrhagia. Neuritis causes most discomfort. Vaginal examination: an inflammatory mass could be felt to the right of the uterus, tender on pressure and causing pain radiating down the leg. The patient had ten applications with the glass tube and a solution of potassium iodide and iodine. The current used was at first twenty-five mil. amps. gradually increased to fifty, the whole application taking half an hour. There was no abdominal pain on turning on the current, indicating that there was no pus in the mass. This patient was distinctly better at the end of her course of treatment. All pain disappeared, the periods were more normal, there was no discharge and per vaginam the tumour could not be felt.

CASE 2.

Case of salpingitis. Miss B. (Mr. Hewetson). Left salpingitis. Gonorrhœa six months before. Had been curetted once. Had had vaccines, douches and tampons. Complained of pain in abdomen. The discharge was slight, gonococci could not be detected. Per vaginam: the left Fallopian tube was thickened but not very tender. There was tenderness all round the uterus. Treatment: The glass tube with copper sulphate solution 1 per cent. for the first five applications, followed by potassium iodide and iodine 1 per

cent. for the last five. The amount of current used and the length of time were the same as in the last case. This patient was well at the end of her course of treatment and I believe has remained so.

CASE 3.

Case of metritis and cellulitis. Mrs. C. (Mr. Hewetson). Chronic metritis and cellulitis after operation for retroversion. Pain at periods and when defæcating. Per vaginam the uterus is in good position but tender on being moved. There is thickening in the pouch of Douglas. Treatment: Glass tube with a solution of potassium iodide and iodine. Six applications with intervals of four days except when a period was on. The patient improved and has remained well.

CASE 4.

Case of salpingitis. Miss D. (Dr. Edge). Right salpingitis after operation for appendicitis and retroversion. Treatment: Glass tube with potassium iodide solution. Eight applications with no improvement. The failure in this case was probably due to the fact that the shunt rheostat on the milliampmeter controlling the ten to a hundred readings was out of order and the patient was only getting five mil. amps. instead of fifty.

CASE 5.

Case of salpingitis. Mrs. E. (Mr. Jordan). Salpingitis and inflammation of the cervical stump. Supravaginal hysterectomy had been performed for menorrhagia. There was slight hæmorrhage and pain at the time her periods should have come on. The chief discomfort complained of was abdominal pain from the salpingitis. Treatment: Glass tube with copper sulphate solution 1 per cent. was first applied for the endocervicitis. When this had improved after five applications potassium iodide and iodine solution was used. The pain and inflammation so much improved that the patient required only ten applications. I have since heard that she recently had the cervical stump removed for fear of malignant disease. At the operation no salpingitis was found.

CASE 6.

Case of salpingitis. Mrs. F. Dysmenorrhœa and bilateral salpingitis for eleven years. Commenced soon after her marriage and was no doubt of gonorrhœal origin. She had continual pain in her back and abdomen. She had no children. Had been treated with rest, douches and pessaries with no improvement. Treatment: Glass tube with potassium iodide and iodine solution. Eight applications with five day intervals, except at her periods. The dysmenorrhœa and backache disappeared and the mass of

inflammation on both sides subsided. Her medical attendant recently informed me that she was six months' pregnant.

CASE 7.

Case of salpingitis. Mrs. G. Salpingitis and dysmenorrhœa for years. One Fallopian tube had been removed. Had been curetted once and had had the cervix dilated. Per vaginam: a mass could be felt on one side of the uterus which was tender on palpation. Treatment: Copper sulphate solution 1 per cent. followed by potassium iodide solution. Great improvement followed the applications.

Electrolysis, like ionization, sets free various ions and carries them through the tissues, but the term is now used to indicate the breaking up of sodium chloride and other salts in the blood serum and using the ultimate chemical substance developed at the positive and negative electrodes for their local action on the tissue. Sodium chloride in the presence of a current is split up into its elements sodium and chlorine. The sodium ion travels towards the negative pole and links with one atom of hydrogen and one of oxygen from the water, with the result that caustic soda is deposited at the metal electrode. This nascent sodium hydrate has a solvent or fibrolytic action on the structures in contact or near the negative pole, and is found useful in many cases of stenosis. The chlorine ions travel towards the positive pole and link with one atom of hydrogen forming hydrochloric acid. This will combine with the metal electrode (if it should be of copper, zinc or some solvent metal) and form the chloride of that metal. If the metallic action is not required at the seat of contact, platinum is used, since this metal is only split up in the presence of strong acids. This method is useful in the treatment of menorrhagia and metrorrhagia using a copper electrode, from the caustic effect of copper chloride on the uterine mucosa. When zinc is used as the electrode the action is milder, and its chloride has antiseptic and astringent properties in many uterine complaints. Dysmenorrhœa, due to stenosis, is treated by inserting into the os a metal sound, insulated everywhere but at the part in contact with the cervix. The metal of which the sound is made is immaterial since it is to be connected to the negative pole by a terminal attached to it, and therefore no metallic ions are detached at that pole. The positive pole is connected to a wet pad on the abdomen. A current of about ten to fifteen mil. amps. is slowly turned on and continued for fifteen minutes, when the sound which was tight before will be found quite loose in the cervix. The froth which is found on the sound when it is withdrawn is due to the hydrogen developed on its surface. This treatment is commenced

soon after a period is over, so as to get at least three applications before the next is due; as there is generally some reaction for a day or two, the applications should be made at intervals of five to seven days, to allow this to subside. There is not much difference in the symptoms of the six cases of dysmenorrhœa I have treated except in the degree of pain and reflex disturbances set up. All the patients were free from pain for some months after treatment—except one who refused to have more than two applications. Two patients have had no pain for two years.

Menorrhagia and metrorrhagia are treated by using an insulated copper sound. This is inserted into the uterus and connected to the positive pole. The abdominal pad is connected with the negative pole. A current of from fifteen to twenty mil. amps. is slowly turned on and continued for about ten or fifteen minutes. The nascent chlorine which develops at the surface of the sound acts on the mucous membrane and causes a local inflammation and at the same time some copper ions are carried into the uterus for a short distance accentuating this inflammation and causing an obliterative arteritis in the vessels of the mucous membrane. There is a good deal of reaction after the treatment and a dirty brown vaginal discharge. Pain does not follow the treatment, or at most is only a slight backache. As a rule a further application can be given in a week. After the treatment has been given the sound is found tightly fixed in the uterus and cannot be removed till the current has been slowly switched off and then reversed for about five minutes or more. This is due to the caustic action of the hydrochloric acid on the tissues. On no account must the sound be removed until it is quite loose, or a piece of the mucous membrane will be torn off and be found adhering to the metal. With cases that have a reasonably open cervix I wrap some absorbent wool tightly round the bare part of the sound and wet it before insertion with a 1 per cent. copper sulphate solution, then there is no adhesion at the end of the treatment.

CASE 8.

Case of menorrhagia. Miss A. (Mr. C. Martin). Menorrhagia fourteen days with leucorrhœal discharge after, for some years. She was curetted once with no improvement. Very anæmic, as she had an interval of only a week or less between periods. Nine applications resulted in a cure. She has had no return of the hæmorrhage or leucorrhœa since the treatment nine months ago.

CASE 9.

Case of menorrhagia. Miss B. Menorrhagia since puberty. Loss for three weeks and then a serous discharge till the next

period. Curetted once with no benefit. Eight applications stopped the loss of blood and most of the discharge. She kept well for three years, but had a return of the flooding which necessitated hysterectomy. It was found that she had old tuberculosis of the Fallopian tubes.

CASE 10.

Case of menorrhagia. Miss C. (Mr. Jordan). Menorrhagia three years. Loss lasts fourteen days with clots. Curetted three times with no benefit. Uterus big and flabby, os patent. This patient had thirteen applications. The copper sound was wrapped round with cotton wool and wet with solution of copper sulphate, so as to reach a larger surface of mucous membrane than the bare sound would have done. There was but little improvement in this case.

CASE 11.

Case of menorrhagia. Miss D. (Mr. C. Martin). Menorrhagia for years. Curetted twice but still continued to lose. No salpingitis or displacement. She had four applications and was much improved. The bare copper sound was used. This patient could not continue the treatment as she lived at a distance, but she is still keeping fairly well.

CASE 12.

Miss E. (Mr. Hewetson). Chronic metritis. Menorrhagia and leucorrhœa. Redness and burning down the legs. Vulvitis. Curetted once. This case was treated with the bare copper sound first for six applications to improve the uterine condition and afterwards with the glass tube and solution of copper sulphate. When the discharge and vulvitis had cleared up she had several applications of high frequency with the glass vacuum vaginal electrode for the irritation. Altogether she had seventeen treatments and keeps well.

Whilst not suggesting that the treatment by ionization of the various conditions enumerated should supersede surgical methods, I nevertheless feel sure that there are many cases in practice in which this method might be given a trial before deciding on operation. Further, we have an additional method of treatment to fall back upon if operation has failed to cure.

British Congress of Obstetrics and Gynæcology.

THE first British Congress of Obstetrics and Gynæcology was held at Birmingham on June 3rd and 4th. Representatives from the Royal Society of Medicine, Midland Obstetrical and Gynæcological Society, North of England Obstetrical and Gynæcological Society, Edinburgh Obstetrical Society, and Glasgow Obstetrical and Gynæcological Society took part in the proceedings.

Mr. Christopher Martin presided over the meeting in the morning, and Professor Carlton Oldfield presided over the meeting in the afternoon.

The first subject discussed was the Surgical Treatment of Prolapse of the Uterus, introduced by Professor W. E. Fothergill, Professor A. Donald and Dr. Lacey, whose papers are printed separately on pages 251, 256 and 260 respectively.

DISCUSSION.

Dr. HERBERT SPENCER (London) observed that statistics have been described as "lies expressed in terms of figures." He was not able to put forward figures himself, but on the whole he could say that he was fairly well satisfied with vaginal operations for prolapse, and he agreed with Dr. Fothergill that abdominal operations were not necessary. The figures that Drs. Fothergill and Lacey had given included moderate cases as well as severe, and it must be remembered that any of the various methods advocated are very likely to cure these slight degrees of prolapse. Dr. Spencer showed a specimen of a uterus the seat of carcinoma and fibroids which had been completely prolapsed and which he had removed by vaginal hysterectomy. Some cases of severe complete prolapse he thought could only be cured by vaginal hysterectomy. With regard to Dr. Donald's paper, he observed that operations of a wide plastic nature had been performed in this country in the case of prolapse since 1883, and to his knowledge, and by himself, since 1887 at University College Hospital. He was sure that Dr. Donald's method was a good one, but personally he did not use catgut because of certain risks. He employed buried silk sutures as a general rule, and occasionally buried silkworm-gut in old patients. As regards Le Fort's operation, he had done it a few times, but was not favourably impressed with the method.

Mr. T. G. STEVENS (London) expressed his great indebtedness to Drs. Donald and Fothergill, of the Manchester School, for all

that they had given to the gynæcological world in the matter of treatment of genital prolapse. In this respect he felt that in London they had lagged far behind Manchester. Since 1913 he had followed very closely the teaching described, and he was absolutely convinced that the methods advocated were the best up to date. If failure results it is due as a rule to the patient getting up or working too soon after the operation. Personally, he always employed catgut buried sutures in the deep tissues, and had found that buried silk or silkworm-gut often led to delayed suppuration. Catgut nowadays was fairly reliable, especially if a mild chromicised gut was used. Mr. Stevens also drew attention to the risk of secondary hæmorrhage after Dr. Fothergill's operation. In one or two cases it had been very severe and came from vessels just below the cervical mucosa. He thought that it was due to spreading apart of the tissues and not to suppuration. He was of opinion with regard to end-results, that moderate cases of prolapse do not give quite so satisfactory a cure as severe ones, probably because the operation is not so severe. Also he found that the more the procidentia, the easier it was to cure, because of the ease of obtaining plenty of parametrial tissue. Abdominal operation, in his opinion, played no part whatever in the treatment of prolapse.

Mr. A. E. Giles (London) expressed his appreciation of the figures and results brought forward by Dr. Lacey, and referred to the amount of labour required in furnishing such a report. A criticism that he would offer was that it was impossible to gauge the result of an operation by patients' statements. Symptomatic cures were often not anatomical cures. He had noted with interest that amongst the symptomatic failures quoted by Dr. Lacey were several anatomical cures. The converse might also be true. No operation could be curative in *every* case, and for this reason the result should not be guaranteed. In his experience 96—97% of cases were cured after operation. His practice followed mainly that of his old teacher, Professor Donald, but he did not think it necessary to amputate the cervix in every case, as the cervix will return to its normal size. He had seen many cases in which the cervix had been removed by various surgeons, and in some the results were atrocious. Amputation of the cervix was, however, justifiable in hyperplasia of the vaginal portion in nulliparæ. With regard to Dr. Fothergill's operation, he thought that to say it was the *only* method was rather begging the question. There were over 150 different methods of suturing the abdominal wall, and one writer had stated that every one was as good as another. In the same way he could claim equally good results in the treatment of prolapse from hysteropexy combined with a vaginal plastic operation.

J. E. GEMMELL, M.B., C.M. (Edin.).

Honorary Surgeon, Hospital for Women, Liverpool.

THE number of cases operated upon by me at the Hospital for Women, Liverpool, from the year 1902—Dec. 1917 is 480, of these 172 have been traced, and the length of time since the operation varied from $3\frac{1}{4}$ to 15 years, averaging 7 years.

These cases had been dealt with in relationship to the *lesions* present, which were classified :—

Cystocele and rectocele	54
Prolapse (incomplete)	56
Complete procidentia	62
	172

The methods of *treatment* employed were :—

A. Vaginal :
   1. Anterior colporrhaphy and posterior colpo-perineorrhaphy 40
   2. Interposition operation 27

B. Vaginal and Abdominal :
   Anterior and posterior colpo-perineorrhaphy plus ventrofixation 105

The *indications for the choice of method used* :—

Vaginal operations alone :

A. In purely vaginal lesions with no marked uterine descent, in women of all ages and types.

B. In prolapse cases of any degree in women past the child-bearing period when it is permissible to remove large areas of mucous membrane and narrow the vagina.

C. In women past the menopause and in advanced years.

For patients in Section C with complete procidentia, and an atrophied senile uterus, protruding from the vagina, I prefer the interposition operation, which during the 15 years taken has been employed in 80 cases. Of these 27 have been traced, not one of whom had any complaint to make and all were 'cured.'

Vaginal plus Abdominal Operations :

In young women during the fertile period, because—

1. The vaginal operation may be restricted to a moderate removal of tissue.

2. An additional powerful fibro-muscular ligament is introduced with ventro-fixation.
3. Conception and parturition are not affected, and this method of operation stands the test of subsequent parturition.

Of the 105 cases in this group 30 had borne children, and in answer to the enquiries as to subsequent symptoms 16 were 'cured,' and 14 replied 'trivial,' 'slight' and 'occasional' discomfort, but no return of prolapse.

Considerable importance is attached to the method of ventro-fixation employed, the essential details of which must include obliteration of the utero-vesical peritoneal fossa and the formation of a fibro-muscular ligament, by the use of silkworm gut sutures. These sutures are passed through the anterior surface of the uterine muscle at a point immediately above the attachment of the utero-vesical reflection, taking a fair bite of the muscle and being attached directly to the fascia of the rectus sheath, at the lower angle of the abdominal incision just on the edge of the symphysis pubis.

The uterus is thus left in close apposition to the anterior abdominal wall, but in a very short time at the point of fixation a fibro-muscular ligament forms, which allows the uterus to take up its normal position.

Of the total 172 cases traced, the answers to questions as to their present condition has been satisfactory.

Dr. WALTER SWAYNE (Bristol) described with illustrations the method of operation which he had evolved and which very closely followed that of Dr. Fothergill. He reconstructed as far as possible the original pelvic supports, paying special attention to the ligaments of Mackenrodt or Patterson. A cystocele he regarded as a hernia through the anterior part of the fascia covering the vaginal wall. Similarly a retrocele was a hernia through the posterior part of the fascia of the vaginal wall. His experience exactly coincided with that of the Manchester School, and he was averse to abdominal methods. Anatomically, they are not correct procedures. The question raised by Mr. Giles as to the difference between anatomical and symptomatic cures was an interesting one, but after all it appeared to him to be a minute point. Deal with the case by all means on anatomical principles if possible, but above all relieve the patient of her symptoms. He had not had the pluck so far to perform a very severe operation upon women of child-bearing age, and he was of opinion that if this was done, the patient should be warned that the result might be marred by a subsequent labour. He had had some experience of Dr. Blair Bell's procedure, but anatomically it seemed to be unsound although it relieved symptoms.

Dr. C. D. LOCHRANE (Derby) observed that during the past few years he had recorded his results of 350 cases of genital prolapse, but had kept an open mind and given each operation published a fair trial. He thought that the ideal operation should conform to four principles. (1) It should restore the parts as far as possible to the normal condition; (2) it should be applicable to all types of injury and at all periods of life; (3) it should not interfere with pregnancy or cause dystocia; (4) it should be the least dangerous, and as an addendum, the simplest and cheapest! The operation which conformed in his experience nearest to these axioms was the vaginal plastic method without any abdominal operation, and during the last six years he had treated less and less cases by the abdominal route and more and more by the vaginal. Although he had never seen dystocia arise from ventral fixation he had had several cases of recurrence of prolapse following the operation. With regard to the vaginal method, he considered that previous preparation of the patient, especially as to sterilisation of the vagina, was most important and should be undertaken 3 or 4 days before the operation. Whenever he thought that sepsis was likely his practice was to apply bismuth iodoform paste prior to the operation. When amputation of the cervix was required he preferred Bonney's technique to the circular method. Further, he never employed buried sutures but always used a figure of 8 stitch to the perineum.

Professor HENRY BRIGGS (Liverpool) drew attention to the danger of losing sight of general principles in an unbounded enthusiasm for any one method, and entered a protest against what he could only think were the exaggerated and incorrect statements of some of the speakers. It was incorrect to think that one method only could cure prolapse, or that one type of suture material, such as catgut, was the only material admissible. It was very difficult to get at the true facts of the case, just as it was to believe the statement of a man who says that he never gets an incisional hernia after an abdominal operation.

Dr. W. S. A. GRIFFITH (London) referred to cases of prolapse of the vaginal walls following a previous hysterectomy. He personally had had extreme difficulty in dealing satisfactorily with this type of case, and was of opinion that no operation by the vaginal route, short of obliteration of the vagina could be successful. The abdominal route was perhaps indicated for cases such as these. With regard to the points raised by other speakers, he believed in buried sutures and a wide anterior colporrhaphy, in treating ordinary cases of genital prolapse. Retroversion and retroflexion of the uterus *per se* did not often cause symptoms unless the ovaries were also prolapsed, when operative treatment might be required.

Dr. R. H. PARAMORE (London) drew attention to the complete

absence, in the remarks of previous speakers, of any reference to the levator ani musculature in the cause of genital prolapse. He was under the impression that myorrhaphy of the levatores ani was important, and was surprised that no mention had been made of this procedure. His own experience was limited to 11 cases, and of these he only could claim one success. In all the others, separation of the levatores had occurred 2–3 weeks after operation. The speaker referred to Hey Groves' separation of the anterior vaginal wall from the urethra, and also to Cuthbert Lockyer's method of dissection of the levatores ani. His own conception of prolapse was that it was a hernia through the pelvic fascia, and he attempted to narrow the ring by cutting down upon the levatores ani, drilling holes through the pubic arch and approximating the margins of the muscles forming the pelvic diaphragm by a purse-string suture.

Professor GAMMELTOFT (Copenhagen) expressed surprise at not having heard greater reference to the levatores ani. His method of treating prolapse was just to perform a wide anterior colporrhaphy, as is done at Manchester, then to dissect the levatores ani, and approximate these muscles. He always used catgut and had never seen any of the bad results attributed to it. He did not perform any abdominal operations for prolapse, or agree with them.

Dr. J. S. FAIRBAIRN (London) referred to the difficulty of knowing exactly how much tissue to remove in vaginal operations for prolapse, in order to avoid an excessive amount of narrowing of the vaginal canal. On one occasion he had, as a matter of fact, completely occluded the ureters, and subsequently had to remove his sutures. He did not remove the cervix in the percentage of cases described by Dr. Fothergill, and could not quite see the necessity for it. He also drew attention to the possibility of secondary hæmorrhage referred to by other speakers, and stated that he himself had had several instances. With regard to the question of anatomical versus symptomatic cures, he would note that there was no fixed anatomy. The cure should be physiological, and if so anatomy would not count.

Mr. FURNEAUX JORDAN (Birmingham) stated that for many years he used ventral fixation combined with colporrhaphy, anterior and posterior, but the results from the vaginal plastic operation were infinitely better. A few years ago he had seen Dr. Fothergill operate, and he was so impressed by the method that he had always employed it since. It was a tribute to the operation that since he had followed this technique he had had more gratitude from his patients than from all his previous cases. He was quite sure that the operation could not be done without burying sutures, and if it was proved that catgut is not safe, it should not be employed for this purpose.

Dr. MILES H. PHILLIPS (Sheffield), as a pupil of Professor Donald and Dr. Fothergill, had in large measure adopted their practice. At the same time, he could not assert that he had cured *all* his cases, and wondered if any one method would cure all. The type of case in which he failed was the elderly woman with complete prolapse of a small atrophied uterus. In these cases it is impossible to repair the vagina satisfactorily, and he used Mayo's operation of removing the uterus, obliterating Douglas's pouch and suturing the broad ligaments below the bladder.

Dr. T. W. EDEN (London) thought that Dr. Fothergill had tried to devise an operation for *every* case of prolapse. There were a few cases, however, in which this was not possible, and in which Mayo's operation is good and indicated for choice. It was important, therefore, that we should adhere to the principle of selecting the ideal operation for each individual case. For example, the treatment of prolapse in young nulliparous women occasionally offers extreme difficulty. He recalled such a case in which he had performed an extensive posterior colporrhaphy. The procidentia recurred, and Dr. Cuthbert Lockyer did a ventral fixation. The condition again recurred, and Mr. Eden had recently carried out the operation suggested by Mr. Blair Bell of obliterating Douglas's pouch by suturing together the utero-sacral ligaments. The anteversion of the uterus so produced he considered to be important. With regard to Dr. Fothergill's method, he was of opinion that the operation might be improved by associating it with wide separation of the bladder from the cervix, as originated by Cuthbert Lockyer.

Dr. W. H. NEWHAM (Bristol) observed that in Bristol the abdominal route had practically been abandoned in favour of the vaginal operation for prolapse of vagina and uterus. Personally, he had always used silk for buried sutures, and had seen no suppuration which he could attribute to its use. Nobody was infallible, and therefore no man could always guarantee a cure, whatever operation was undertaken.

REPLIES TO THE DISCUSSION.

Professor FOTHERGILL, in reply, said that he had never seen or heard of any disastrous cases of secondary hæmorrhage following the vaginal operation. Undoubtedly it occurred, but it could always be controlled, and he attributed it to sepsis. With regard to interposition of the uterus, he thought it a bad operation. It was attended by some mortality and a large proportion of unpleasant sequelæ, to say nothing of recurrences. He had not mentioned suture of the levatores ani muscles, as he considered it a minor part of the operation. It was always done in Manchester and was

included under the term, "repair of the perineum." He quite agreed that some of the most difficult cases were those of prolapse of the vagina following hysterectomy. In young women also the operation would be very difficult.

Dr. LACEY, in reply, said that in Manchester no special preparation of the patients was undertaken. The women were admitted 24 hours before operation and simply had a douche of cresol or perchloride of mercury. The vulvas were covered by a perchloride compress. He could not understand how Dr. Lochrane achieved his results without burying his sutures.

Professor DONALD, in reply, thanked Mr. Stevens for his very kind remarks. With regard to vaginal plastic operations for prolapse, there was no doubt that hæmorrhage did occasionally occur and it spoilt one's operation. He employed a deep figure of 8 suture to control it, and amputated the cervix by Bonney's method. As to the operation described by Dr. Gemmell, he would like to note that it was orlginated by the late Sir J. Sinclair. Dr. Miles Phillips had drawn attention to the possibility of subsequent prolapse of the pouch of Douglas. In reply, he would say that if colporrhaphy is carried sufficiently high it cannot occur. With regard to hysterectomy as a cure for prolapse, he could not speak in favour of it, and had seen no more deplorable cases than those of prolapse of the vaginal walls containing coils of intestine, occurring subsequently to vaginal hysterectomy. Again, he did not think that it mattered whether the uterus was subsequently anteverted or retroverted as long as it did not prolapse.

SPECIMENS.

Two Specimens showing unusual conditions of the Sutures after Cæsarian Section.

CLIFFORD WHITE, M.D. (Lond.), M.R.C.P. (Lond.), F.R.C.S. (Eng.),

Surgeon, Samaritan Hospital; Gynæcologist, Metropolitan Hospital; Obstetric Surgeon, Queen Charlotte's Hospital.

AT the recent discussions on rupture of the Cæsarean section scar opened by Mr. Holland and Dr. Munro Kerr last autumn, the opinion was expressed by a large number of authorities that a non-absorbable suture gave the most firm union in the wall of the uterus after Cæsarean section. It was also suggested that if a non-absorbable suture were used any weakness of the scar was the result of sepsis. The two specimens shown this afternoon have a

bearing on these points, and also show one of the drawbacks in the use of silk or thread.

Although, as I stated at that meeting, I consider a linen-thread suture by far the best to employ in suturing the uterus after Cæsarean section, it is not ideal and one of its defects is that occasionally a stitch may work its way towards the endometrium and then cause menorrhagia or may act like a seton, and set up a constant sanious discharge. The same symptoms will arise soon after the operation if, by accident, the suture is taken through the decidua when the uterus is being stitched.

The first specimen shown demonstrates the results of infection of stitches and the resulting weak scar which consists almost entirely of peritoneum.

Briefly the history of the case is as follows:—

A primigravida, aged 24, was sent into Queen Charlotte's Hospital on October 27, 1920, after being in labour for 30 hours. The head was high above the brim and the diagonal conjugate only $3\frac{1}{2}$ inches. She was seen by a colleague, who performed Cæsarean section as the child was alive. The high incision was used and the child extracted in good condition. The uterus was stitched by interrupted linen-thread sutures.

The temperature during the first 11 days of the puerperium never reached higher than 100·6° and was about 99° on most days. The pulse was never recorded as being over 100, and there was no abnormal symptoms. Her bowels had been acting daily with the aid of mild laxatives.

On the 10th and 11th days the bowels did not act, and on the 12th I was asked to see the patient as I was again on duty. There was some distension and increased peristalsis. Pulse 100, temperature 99°. An enema gave no result, so I opened the abdomen through the old scar at 9.30 p.m.

There was free fluid in the peritoneal cavity and the bowel was obstructed by being adherent in four places. Three of the kinks were due to adhesion of three loops of gut to the edges of the abdominal incision. The fourth coil was adherent to the uterine incision, and as I attempted to free it a piece of softened uterine tissue came away with it. On inspecting the uterus, it was found to be fairly well involuted, but was oozing from the suture line. The tissue of the uterus was pale greyish-white in colour and quite soft. Its odour was slightly offensive. The stitches were lying loose on the peritoneal surface and had cut through the whole of the wall of the uterus except its peritoneal covering. I then did a total hysterectomy and placed drainage tubes in the pelvis and both loins. After operation, the pulse was 130 for 24 hours, but the temperature never rose above 100°F., and she rapidly made an

uninterrupted recovery. I wish specially to draw attention to the fact that from the beginning this patient was practically free from fever.

The specimen shows a uterus 13 by 10 by 4 cms. with the usual Cæsarean incision in its anterior wall. In the lowest portion, the muscular tissues have united to some extent, but in the whole of the upper part the peritoneal coat is the only part in apposition and the muscle has retracted widely. The stitches have cut through the muscular tissue.

The second specimen consists of a uterus containing a cervical fibroid. I saw the patient on June 5th, 1919. She had been in labour 20 hours but the membranes were unruptured. Labour was obstructed by a pelvic tumour. I performed Cæsarean section as soon as the necessary arrangements could be made.

During the operation a contraction ring was found to have formed so tightly round the neck that it had to be cut through before the child could be extracted. As the patent had journeyed to London, and her general condition was not very good, I made no attempt to remove the tumour, but sutured the uterus in the usual way with linen-thread interrupted sutures. The child weighed $9\frac{3}{4}$ lbs., and did well.

In 1920 the patient complained of some pelvic pain and increased monthly loss, and saw several gynæcologists, who all advised hysterectomy. I removed the uterus on November 3rd, 1920.

The body of the uterus is of normal size. The cervix is elongated, and has a fibroid measuring 9 by 6 by 6 cms. attached to its lowest portion just above the external os. The body of the uterus has been cut across at right angles to the cavity. The muscular wall of the uterus is firmly united in its whole thickness, but linen-thread sutures are appearing through the endometrium. Several can also be seen deeply embedded in the muscular tissue.

Degree of Absorption of Silk Sutures after Cæsarean Section.

E. J. Maclean, M.D., C.M. (Edin.), M.R.C.P. (Lond.),
Gynæcologist, Cardiff Infirmary.

Mrs. O. Age 40. Primigravida.

Indication: Persistent transverse position with an intramural fibromyoma in the posterior wall just above the cervix constituting an obstruction to rectification and engagement.

First operation: Date *2.7.20.* Cæsarean section was performed and the uterine wall sutured with interrupted stitches of No. 4 silk.

The walls of the uterus were found to be occupied by several interstitial fibromyomata of small size. In view of the patient's general condition it was not considered advisable to proceed to hysterectomy.

Second operation: Date *26.11.20.* In view of persistent symptoms being caused by the fibroid, subtotal hysterectomy was performed. The silk uterine sutures were as shown.

Microscopically, in a section taken through one of the suture sites well-marked areas of round-celled infiltration are seen formed as the result of the continual presence of the irritant. Phagocytes are also seen.

Professor WALTER SWAYNE referred to a case of vesical calculus occurring in his practice after the use of silk sutures in a pelvic operation. He thought it probable that the bladder had been wounded on this occasion. His present technique always involved the use of catgut ligatures.

Dr. CROFT (Leeds) stated that he had had some experience of examining uteri after Cæsarean section had been performed, and he had found the whole of the silk absorbed. He also had had a case of vesical calculus following operation, but he still employed silk as a suture material and got good solid union. He believed that silk was *slowly* absorbed, but its great value in Cæsarean section was that it persisted until the uterine was healed.

Dr. HERBERT SPENCER was glad to hear this eulogy of silk sutures. With regard to its disappearance, he had noted it, on occasion, completely to disappear in three months. On the other hand, he had known it persist for 17 years. Patients undoubtedly differ in this respect. He advocated silk of the "floss" type and fairly thick sutures should be used. On only one occasion had he seen any adhesion of omentum or intestine to the scar.

Mr. COMYNS BERKELEY (London) remarked that he had always used silk sutures both at Middlesex and at the City of London Maternity Hospitals, as also in private practice, and he had never had a case of the uterus rupturing afterwards, although he had performed Cæsarean section twice on the same patient in many cases and three times on a few. He had no doubt that silk was the proper material to use since it was impossible to believe, for instance, that the record of the London Hospital as compared with his own hospitals was entirely due to some other difference in technique. Catgut did not always become absorbed even with an aseptic recovery. Only a fortnight ago he had to operate for the second time on a patient, six years after a myomectomy, and he found the catgut sutures he had used at the first operation still *in situ,* knots and all.

Mr. EARDLEY HOLLAND (London) said that he had nothing new to add to what he had stated a year ago, when he thought that he had proved that catgut was not the best suture material for the uterine wall owing to the risk of subsequent rupture. Mild sepsis could arise without any evidence of clinical value, as in one of Mr. Clifford White's cases.

Dr. MILES H. PHILLIPS did not believe that silk was ever absorbed.

Mr. FURNEAUX JORDAN thought that theoretically silkworm gut was the best material to use, and his views coincided with those of Mr. Eardley Holland.

Combined Fibromyoma and Carcinoma of the Uterus.

E. J. MACLEAN.

Age 53 years.

Five children, the youngest being 14 years old : no miscarriages.

History of pelvic pain of indefinite duration but worse for the last six months, during which irregular uterine bleeding had appeared and had been of increasing frequency and intensity.

On examination a large fibromyoma was found involving the cervix and showing necrobiotic change.

Operation was performed—pan-hysterectomy—August 1920, and the uterus, removed and cut open, showed a large smooth fibroid $4\frac{1}{2}$ in. long involving the cervix, also an ulcerating condition of the interior of the corpus uteri.

Microscopically (Scholberg), definite carcinoma was reported in a section of the ulcerating area examined.

References.

MACLEAN, operating on 500 cases of fibromyoma uteri, has found concurrent carcinoma in only 2 cases—1 of cervix, 1 of body —0·4 per cent.

KELLY and CULLEN in 1,400 cases found cancer of the body in 1·78 per cent., and of the cervix in 1·28 per cent.

NOBLE, in 1,118 cases, found cancer of the body in 2·4 per cent., and of the cervix in 1·0 per cent.

TRACEY, in 3,561 collated cases, found cancer of the body in 1·7 per cent., and of the cervix in 0·7 per cent.

EDEN. "It may definitely be stated that in 3 or 4 per cent. of fibroid tumours removed by hysterectomy, carcinoma has been found and with somewhat greater frequency in the body than in the cervix."

—— "If it were possible to calculate the association of cancer with fibroids generally, and not alone with cases operated upon, the aspect of the matter would probably be greatly changed."

Dr. HERBERT SPENCER was surprised to hear that Dr. Maclean had met with so few examples of concurrent fibroids and carcinoma uteri. He had seen many cases and in fact many years ago read a paper advocating total hysterectomy in cases of fibroids on account of this very risk. He had noted 6 examples of unrecognised and early carcinoma in 200 cases of fibroids.

Dr. F. EDGE (Wolverhampton) had had in one year 6 cases of carcinoma of the cervix subsequent to sub-total hysterectomy, and was of opinion that Dr. Herbert Spencer was right in his contention.

Dr. J. S. FAIRBAIRN's experience differed from the previous speakers, and he thought that the combination was very rare. He had only met with one example, and he reserved the right of performing sub-total or total hysterectomy for fibroids as circumstances demanded.

Mr. HAROLD CHAPPLE showed a specimen which he considered to be a *Full-time Ovarian Pregnancy*,

A Twelve Months' Ovarian Pregnancy?

HAROLD CHAPPLE, M.B., M.C. (Cantab), F.R.C.S. (Eng.),
Obsteric Surgeon and Gynæcologist, Guy's Hospital.

MRS. ——, æt. 33, was seen by me on March 2nd, 1921.

Previous history. One year before the present pregnancy began, patient thought she had a miscarriage at the sixth week. Her last menstrual period was from February 29th to March 3rd, 1920, and it was normal. The abdomen had gradually enlarged, and in September 1920 the patient first felt fœtal movements, and these had continued until the end of November, when there was a rather indefinite history of labour pains. As labour did not supervene the patient was seen in December by a very distinguished gynæcologist, who confirmed the diagnosis of pregnancy. On March 2nd, 1921, when I saw her, there was a tense cystic swelling occupying the greater part of the abdomen. The uterus could be made out to the right and below the tumour, and was not enlarged. The fœtus could not be definitely palpated. No heart sounds could be heard, there were no uterine contractions and no uterine souffle.

On March 4th I opened her abdomen, and found a large mass adherent to the omentum, transverse colon and small intestine. It was possible, with some difficulty, to separate these structures from the tumour everywhere except at the left pelvic brim where the mass was found attached by the infundibulo pelvic ligament, and on dividing this the cut ends of the ovarian vessels were seen. During this process of separation the left ureter was found running

on the lateral aspect of the mass, and the left round ligament, much elongated, lay across the front of the mass, as did the left Fallopian tube, which was cut in the process of separation. The uterus itself and the right tube and ovary presented no abnormalities.

No hæmorrhage occurred during the removal of the tumour, and the patient made an uneventful recovery.

The specimen, on examination, was a smooth, somewhat ovoid, mass with a thick wall, and on being laid open contained a little dark fluid and a fully-developed well-preserved male fœtus. The head was in the upper end of a perfectly smooth cavity. Embodied in the wall was a fully-developed placenta to which the fœtus was attached by a normal cord. In the substance of the wall were two large separate hæmatomata.

Microscopic sections of the various portions of the wall failed to reveal any ovarian substance. There is no sign of any ovary in the specimen.

Dr. CUTHBERT LOCKYER (London) suggested that the specimen might be a tubo-ovarian rather than purely an ovarian pregnancy.

Dr. HERBERT WILLIAMSON (London) suggested that the specimen be referred to the Pathology Committee of the Obstetric and Gynæcological Section of the Royal Society of Medicine for detailed examination and report.

The proposition was accepted, and upon the proposal of Dr. THOS. WILSON (Birmingham) the pathologist already at work upon the specimen will be invited to join the Committee.

Mr. GILES proposed that the report of the pathologist be received before the Commitee met. This was eventually agreed to.

Microscopical Preparations of an Early Ovum.

GILBERT J. STRACHAN, M.D. (Glas.), M.R.C.P. (Lond.),
Research Pathologist, Cardiff, Medical Research Council.

The ovum was computed as being 16 to 18 days old. The specimen was obtained as the result of an abortion in a patient who had not missed a menstrual period. The ovum was discovered in a mass of blood-clot passed per vaginam and subsequently examined in detail. The small chorionic sac, about the size of an average index finger-nail, was hardened before section. Microscopically, the gestation sac shows amnion and well-marked chorionic villi. The section exhibited was taken through the cephalic flexure, and showed the early differentiation of the nervous matter into grey matter and white matter.

The Pathology of Syphilis of the New-born Infant.

Dr. F. J. Browne (Edinburgh). See page 153.

Dr. Carlton Oldfield (Leeds) thought that one very important fact which had resulted from Dr. Browne's paper was that the diagnosis of syphilis as a cause of still-birth cannot be made without a very exhaustive investigation.

Professor Gammeltoft agreed with Dr. Browne that neither examination of the placenta nor the Wassermann reaction can be relied upon in the diagnosis of fœtal syphilis. He considered, however, that endarteritis of the vessels of the umbilical cord was a very important diagnostic point.

Mr. Eardley Holland congratulated Dr. Browne upon his excellent paper. Personally he had been interested for some time in the still-birth problem, but his investigations had been confined to viable and not macerated fœtuses. The problems he had set out to investigate were two, viz., the incidence of fœtal syphilis as a cause of still-birth and how to diagnose syphilis in the absence of spirochætes. Formerly the percentage of fœtal deaths due to syphilis was thought to be as high as 50 per cent. Lately, however, it had been proved by Whitridge Williams and others that 15 per cent. was nearer the mark. His investigation in 37 cases had been confined to the following points: (1) the Wassermann reaction in the mother; (2) the presence of chondro-epiphysitis in the fœtus; (3) enlargement of the liver; (4) enlargement of the spleen; (5) examination of the placenta. In the case of the Wassermann reaction he had found it *positive* in the mother in 97 per cent. of the cases investigated. Chondro-epiphysitis was also present in 97 per cent. of the fœtuses. The spleen was enlarged in every case and the liver in nearly all cases. A difficulty arose with regard to the weight of organs, in that there is at present no absolute standard. It was necessary to consider therefore the ratio of the weight of the liver and spleen to that of the fœtus, and this was the line he was now taking. If both organs were enlarged, Mr. Holland considered it a very important diagnostic point. The largest spleens occur in cases of general œdema of the fœtus. As regards the placenta, naked eye appearances are of no value. Typical microscopic appearances, however, were present in 67 per cent. of the cases examined. In all these spirochætes had been demonstrated in the tissues. In the case of 263 still-born fœtuses in whom spirochætes could not be found, 25 were considered worthy of detailed investigation; 5 of these showed certain evidence of syphilis in spite of the apparent absence of spirochætes.

Dr. G. I. Strachan agreed with Dr. Browne as to the difficulty of diagnosing fœtal syphilis from an examination of the

placenta. Indeed, on one occasion, when asked to obtain a syphilitic placenta, he had had the greatest difficulty in finding one. He considered, however, that examination of the umbilical cord was most important, even if the Wassermann reaction was *negative*. Spirochætes are demonstrable in the arterial walls, as well as endarteritis. From the examination of 100 cases of still-born fœtuses, he believed that syphilis was a very rare cause of ante-natal death.

Professor SWAYNE, from an investigation of the Wassermann reaction in the case of new-born infants, was of opinion that syphilis is much less common as a cause of infant death than is suspected. Certainly a *positive* Wassermann reaction is much more difficult to obtain in new-born infants, even if obviously syphilitic, than in adults.

Short Review of Cases of Extra-uterine Pregnancy.

Mr. GORDON LUKER (London). See page 263.

Dr. E. C. PURSLOW (Birmingham) thanked Mr. Luker for his valuable record of an unusual number of cases very concisely put. He referred to rectal tenesmus as being an important symptom, although occasionally diagnosis may be very difficult. For example, he had met with cases of typical uterine abortion associated with a tubal mole.

Mr. EARDLEY HOLLAND referred to the difficulty of diagnosis, inasmuch as the typical signs of amenorrhœa, hæmorrhage and pain are not always present. With regard to the causation of tubal gestation, lately he had been examining the opposite tube for signs of inflammation and had found it in three-quarters of the cases investigated.

Mr. A. E. GILES referred to the two schools of thought that exist with regard to the causation of tubal gestation. The one believes that the tube in all cases is normal, and the other that it is diseased.

Dr. HERBERT WILLIAMSON drew attention to the difficulty in diagnosis between ectopic gestation and theca-lutein hæmatoma. In the latter, the menstrual period was often late, and there was acute abdominal pain followed by hæmorrhage, and the picture was thus typical of tubal gestation.

Dr. CARLTON OLDFIELD also referred to the point of diagnosis raised by Dr. Williamson, which he considered very important. Repeated attacks of pain were more suggestive of hæmatoma than tubal gestation.

Dr. W. S. A. GRIFFITH thought that the breast changes might prove useful in the diagnosis between these two conditions.

Dr. HERBERT WILLIAMSON pointed out that breast changes also occur in the case of lutein cysts due to the stimulating action of lutein.

Malignant Neoplasm involving the Small Intestine.

Professor WALTER SWAYNE, M.D., B.S. (Lond.),
Obstetric Physician, Bristol Royal Infirmary.

The specimen shown was a malignant neoplasm involving the small intestine which had been removed from a nullipara, and which had been reported to be chorion-epithelioma by the pathologist to whom the specimen had been submitted.

Mr. T. G. STEVENS said that if the diagnosis was accepted it was a most important specimen. Personally, he believed that it was a carcinoma and in the section that he had examined no syncytium was present. The only thing suggestive of chorion-epithelioma was the large amount of hæmorrhage into the tissues. The specimen was referred to the Pathology Committee of the Royal Society of Medicine, Obstetrical and Gynæcological Section.

Ionisation in the Treatment of certain Gynæcological Ailments.

J. SANDISON CRABBE, L.R.C.P., L.R.C.S. (Edin.). See page 266.

Professor HENRY BRIGGS exhibited specimens and illustrations, showing the pathology of various uterine polypi.

On June 4th, at 10 a.m., gynæcological operations were performed at the General Hospital, Birmingham, by Mr. Beckwith Whitehouse and at the Women's Hospital by Dr. Edge and Mr. Hewetson. At the Queen's Hospital, by invitation of Dr. Purslow, Professor Fothergill operated upon a case of genital prolapse.

CLINICAL REPORTS.

Fibro-myo-lipomata of the Uterus.

By

HERBERT WILLIAMSON, M.B. B.Ch. (Cantab), F.R.C.P. (Lond.),
Physician Accoucheur, St. Bartholomew's Hospital;
and
R. ST. LEGER BROCKMAN, M.R.C.S., L.R.C.P.,
Late Intern Midwifery Assistant, St. Bartholomew's Hospital.

THE presence of fat in a uterine fibromyoma is a common phenomenon. In most instances the fat results from tissue degeneration, and by examining sections from different parts of the tumour the process of its formation can be traced stage by stage. The individual fibres become swollen and lose their characteristic stain-reactions, the nuclei are broken up and destroyed, and finally the area affected is converted into a mass of hyaline material in which traces of muscle and connective-tissue fibres can still be seen. The fat is deposited in this area in the form of small globules lying both within the remains of the muscle cells and in the hyaline material surrounding them.

In the group of cases we propose to describe in this paper the fat is found only in well-defined rounded and polygonal cells seen after it has been dissolved out as thin envelopes of cell-substance in which a nucleus is embedded. These cells are massed together in groups, and the groups are separated from one another by strands of muscle and fibrous tissue which sometimes show hyaline change, but no fatty degeneration. Tumours containing these cell groups we designate "fibro-myo-lipomata."

Specimen No. 3001 in St. Bartholomew's Hospital Museum is a typical instance of such a tumour. It is thus described in the catalogue:—"A pedunculated fibrous tumour of the uterus with a small, well-defined, encapsuled, fatty tumour embedded in it near the centre of the mass. It was removed by operation from a woman, aged 50. Its growth was not accompanied by any symptoms, but it suddenly protruded from the vagina during an action of the bowels."

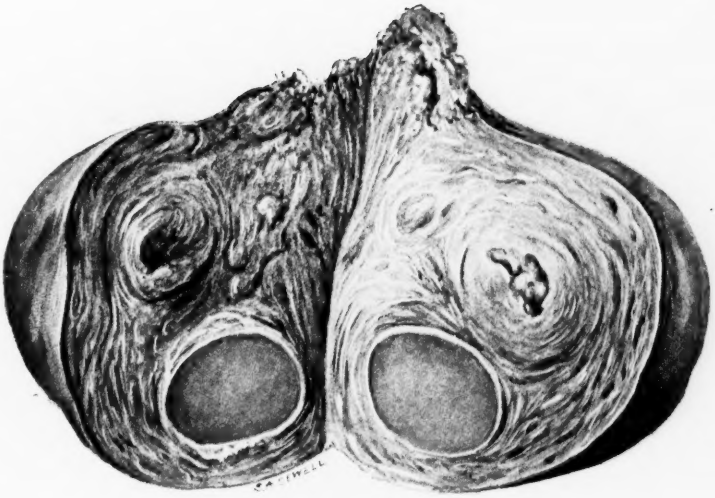


FIG. 1.

Encapsuled fibro-myo-lipoma of the uterus.

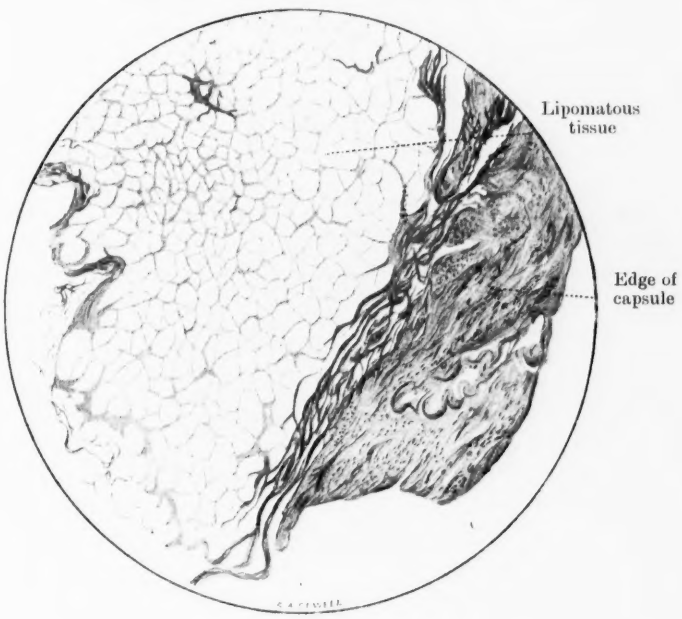


FIG. 2.

Microscopic section of encapsuled fibro-myo-lipoma of the uterus.

This specimen was exhibited at a meeting of the Pathological Society of London in 1861 by the late Sir Thomas Smith, who described it as "an adipose tumour the size of a pigeon's egg, completely embedded in the substance of a larger tumour, and surrounded by a fibrocellular capsule from which it was easily shelled out."

This tumour is remarkable in that the fibro-myo-lipoma is encapsuled and quite distinct from the rest of the tumour of which it forms a part. We have prepared microscopic sections and have re-described the specimen as follows: "An ovoid tumour, measuring 7 cm. by 6 cm. by 9 cm. Its surface is for the most part smooth, but two rounded lobules project from the lower pole and a short pedicle is attached to the upper pole. The tumour has been bisected and the cut surfaces show an encapsuled yellow mass, measuring 3 cm. by 2·5 cm. embedded near the centre of the lower half. This mass is separated from the surrounding stroma by a clearly defined white capsule; it has the appearance of fat, and oil globules can be scraped from the surface. The stroma is composed of dense fibrillated tissue, and contains an irregular cavity 1 cm. in diameter."

Microscopic Appearances.—The sections have been difficult to prepare because the specimen has been immersed in spirit for nearly sixty years, and the tissues have become very hard. The yellow mass is composed of a network of fibromuscular strands, and between these strands of tissue are fat cells. The fat cells are rounded and polygonal, and, where the fat has been dissolved out by the reagents used in preparing the sections, appear as spaces surrounded by a thin envelope of cell substance, in which a nucleus is embedded. The masses of fat cells are separated by strands of fibromuscular tissue, which van Gieson's stain shows to consist of muscle bands with a small proportion of collagen fibres. These bands show hyaline changes but no fatty degeneration. In sections stained by Sudan III fat can still be seen occupying the interior of the rounded cells just described. A section through the capsule shows that it is composed of fibromuscular tissue (see Plate, fig. 2).

We have found records of eight similar tumours:—

(1) Seegar (1853).[1] A widow, aged 53, had suffered from severe hæmorrhage for a year. A tumour, the size of a child's head, was found protruding from the vulva. The pedicle was ligatured and the mass removed. It consisted of "a fatty tumour covered by a firm cellular membrane and traversed by fibrous tissue-bands. Parts of the tumour were soft, others firm and poor in blood-vessels." No microscopic description is given.

1. *Zeitschr. f. Wundaerzte u. Geb.*, 1853, v, p. 24.

(2) Kelly and Cullen (1894).[2] The patient was aged 50, but no details of the clinical history are given. The uterus measured 32 cm. by 32 cm. by 36 cm. The enlargement was due to an interstitial myoma. Microscopic examination showed hyaline degeneration and small areas of adipose tissue; the latter consisted of groups of three to eight or more fat cells seen principally in close proximity to the vessels. A drawing of the microscopic section is given on p. 164 of the authors' book.

(3) Kelly and Cullen (1895).[3] The patient was aged 29, but no further clinical details are given. The uterus contained multiple fibro-myomata, the largest tumour measuring 13 cm. by 20 cm. by 28 cm. Some of the nodules showed hyaline degeneration with liquefaction. In several sections small groups of fat cells were found. A microscopic drawing is given on page 165 of the book quoted.

(4) Knox (1901).[4] The patient was aged 63 and the mother of thirteen children. The menopause occurred at the age of 50; three years later a slight serous vaginal discharge was noticed which soon ceased, but returned again after an interval of eight years. For two weeks before operation there had been moderate but continued hæmorrhage. After hysterectomy a tumour, 10 cm. by 10 cm. by 13 cm., was found in the posterior wall of the uterus. On section the cut surface showed a network of white glistening bands and in the interstices yellow areas. Microscopic sections showed collections of large fat cells enclosed in a supporting framework of smooth muscle and fibrous tissue. Drawings of the tumour and microscopic section are given.

(5) Gordon Ley (1914).[5] The patient was aged 54 and had borne children. The menopause occurred six years previously, and one year before operation bleeding commenced and gradually became more continuous. After subtotal hysterectomy a tumour, 12 cm. in diameter, was found embedded in the posterior wall of the uterus composed of nodules—some white, some white with yellow streaks, some yellow. Microscopic examination showed that for the most part the section was made up of fat envelopes separated by narrow strands of collagen fibres and muscle. Drawings of microscopic sections given.

(6) Lockyer (1918).[6] The patient was aged 51 and had borne

2. "Myomata of the Uterus," p. 162.
3. *Loc. cit.*
4. *Johns Hopkins Hosp. Bull.*, xii, p. 318.
5. *Proc. Roy. Soc. Med.*, 1913-14, vii (Sect. Obst. and Gn.), p. 150.
6. "Fibroids and Allied Tumours," 1918, p. 65.

one child. Uterine hæmorrhage commenced three years before operation; the losses were frequent and profuse. Pan-hysterectomy was performed. The uterus contained two tumours, one in the body the other in the posterior wall of the cervix. Fat was present in the cervical tumour only. The author says "the sections show large fat globules within muscle fibres . . . but the large globules of fat are quite different from the small granules seen in fat necrosis." Colour illustrations of the tumour and sections are given.

Dr. Lockyer generously presented one-half of his specimen to St. Bartholomew's Hospital Museum, and we have cut other sections. These sections show typical signet-ring fat cells in interstices between fibromuscular bands. We saw in addition large globules of fat as shown in the illustration in Dr. Lockyer's book, but in our opinion they are not within, but lying upon, the muscle cells, and consist of fat liberated from the lipoma cells in the preparation of the section. We regard this tumour as a true fibro-myo-lipoma.

(7) Specimen, No. 1419.1,[7] in the museum of the Royal College of Surgeons of England is thus described in the catalogue:—"A uterus in the wall of which there has grown a spheroidal tumour 10 cm. in diameter. Except at its lower end, the growth, which has been bisected and opened out, and from which the uterine tissue has widely retracted, consists almost solely of fat. A myo-lipoma. Microscopic examination shows that the fat has been formed in the connective-tissue between the muscle cells, the bundles of which are widely parted as a result." The tumour was removed by Mr. Albert Carless from a woman, aged 66, who had never borne children. The tumour had been known to exist for sixteen years, but had never caused symptoms. Unfortunately the microscopic section cannot be found.

(8) Russell Andrews (1921).[8] The patient was a multipara, aged 38, who for two years had suffered from excessive and increasing losses at the menstrual periods. The uterus contained a tumour 15 cm. by 17 cm. with a yellow translucent area near its centre. Microscopic sections showed groups of typical fat-cells each occupied by a single large globule and the groups were separated from one another by strands of fibro-muscular tissue undergoing hyaline degeneration. No muscle-fibres contained fat and no transition forms between the fully-developed fat-cells and the connective-tissue cells of the stroma were seen."

7. The description of the microscopic appearances is too vague to allow us to classify this tumour with certainty.

8. *Proc. Roy. Soc. Med.*, Vol. 14, No. 7, p. 305.

We think these tumours are best described as fibro-myo-lipomata because this name is a statement of fact and binds us to no theory of origin. Knox regards them as mixed tumours, and remarks that the presence of lipomatous tissue in fibro-myomata supports the theory of Cohnheim which attributes their development to embryonal tissue-rests. Ley uses the term "lipomatosis," and states that the distribution of the lipomatous tissue and the absence of young fat granule-cells are in favour of a fatty metamorphosis of the fibrous stroma. Lockyer prefers the term "fatty metamorphosis": he believes that the change affects chiefly the muscle fibres and regards the presence of fat as "evidence of vital but depraved activity." Andrews is content to call his tumour a fibro-myo-lipoma and agrees that the appearances seen admit of different interpretations. Turnbull, who examined the sections, described them as "lipomatosis of the stroma of an intra-mural fibro-leio-myoma of the uterus: an example of fatty infiltration of the fibrous tissue." In our opinion the balance of evidence is against a fatty infiltration. We see no difficulty in accepting the view that there is a metamorphosis of muscle and fibrous tissue-cells into fat cells; but this thesis has not been proved, for no writer has yet described transition forms between the characteristic fibrous tissue and muscle-cell and the typical fat-cell of these tumours, whereas such forms are seen in every stage in a fibro-myoma undergoing sarcomatous change.

It is a fact of clinical interest that with two exceptions the patients were over fifty years of age, and that bleeding after the menopause was the commonest symptom.

Two Cases of Abdominal Pregnancy at Term.

By J. C. Holdich Leicester, M.D., B.S., B.Sc., M.R.C.P. (Lond.), F.R.C.S. (Eng.), I.M.S.

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I.

C——, Hindu female, aged 35, married 20 years, was admitted to the Eden Hospital on November 5th, 1919, with the following history :—She has had 5 children, the youngest being 3 years old. This child was nursed for two years. She had no abortions. Amenorrhœa continued for one year after delivery. After this menstruation was regular each month, the last period commencing about the 13th August, 1918. About the third week of September 1918 she had a scanty blood discharge from the vagina lasting for about 3—4 days; but states that this was not like an ordinary period. About eight days after the onset of this bleeding she had a sudden attack of severe pain in the lower abdomen, and fainted, remaining unconscious for about 15 minutes. The pain was of a paroxysmal character, and lasted for three days. There were about 3—4 more similar attacks of pain during the course of the next month, each lasting 3—4 days, but they were not so severe as the first one; nor did she faint during these attacks. After these attacks the patient felt some heaviness in the lower abdomen. About the middle of December, 1918, the patient noticed a tumour in the hypogastric region for the first time, which was then tender to pressure. The tumour at first grew more to the right side. About the middle of March, 1919, movements were felt for the first time. For about one month, from the middle of July, 1919, the patient used to get spells of severe intermittent pain (like labour pains) in the tumour nearly every day. Four days after the first attack of pain a blood discharge from the vagina appeared, and continued for about a month. On the eighth day of the discharge a fleshy mass was discharged. No movements have been felt since August, 1919.

On admission, a tumour was detected occupying the abdomen rising out of the pelvis and reaching to about two inches below the ensiform cartilage. The tumour was fairly regular in outline, and felt solid in consistence. No fœtal parts could be detected or heart sounds heard. Per vaginam, the cervix was pushed forwards right against the pubic arch by the tumour that was lying behind.

On November 10th, under chloroform, the abdomen was opened by a paramedian incision on the left side reaching from the symphysis to about two inches above the umbilicus. A tumour, the size of a full-time pregnant uterus, presented, somewhat adherent to the parietes, and on incising this some liquor amnii escaped and a full-time dead female fœtus was delivered. On examining the sac it was found to lie to the right of the uterus, which was normal in size, and was evidently growing from between the layers of the right broad ligament, stripping the peritoneum upwards from the posterior abdominal wall. The omentum was adherent to it. The right tube and ovary could not be distinguished. The left tube and ovary were normal. The right round ligament crossed in front of the sac.

A macerated placenta and a considerable amount of old blood-clot were removed from the sac. There was very little bleeding from the placental site.

As the sac could not be removed its edges were stitched to the lower end of the abdominal incision and a rubber drain tube inserted. The rest of the abdominal incision was closed in layers and a dressing applied.

The fœtus weighed 5 lb. 5 oz., and appeared to be full-time. No deformity was apparent.

The tube, which was changed for a smaller one on the 18th of November and again on the 21st, as the discharge, which was of a tarry colour and consistence, was rapidly diminishing, was removed on December 21st, 1919.

On January 8th the abdominal wound was completely closed and the scar was sound and firm. Per vaginam the uterus was normal in size and position and no thickening could be felt anywhere. The patient was discharged from Hospital on this day.

II.

N——, Hindu female, aged 18, was admitted to Hospital, December 27th, 1919, with the following history:—She has been married seven years. Had had one child, 4 years ago, which she nursed till March, 1918. No abortions.

Menstruation recommenced four months after confinement, and occurred regularly once a month till December 1918. The last period began about the 13th December, and lasted for five days; it was normal in character.

In February, 1919, the patient began to suffer from morning sickness, and thought herself pregnant.

In May, 1919, she had a sudden attack of severe pain in the lower abdomen; the pain was severest at the onset, and gradually

wore off, lasting for four days. At the height of the pain on the first day she fainted. There were three similar attacks of pain in the course of the next month, and on each of these occasions the patient fainted on the day of the onset of the pain. There was no blood discharge from the vagina at this time.

When these attacks of pain were over, *i.e.*, by June 1919, the patient felt a tumour in the lower abdomen for the first time; it was situated more to the left than to the right of the middle line.

This went on growing till September, 1919, when it attained its maximum size. She felt movements for the first time in July, 1919.

From about the 12th September for a period of 15 days, the patient suffered from *continuous* pain in the abdomen and back, and there also was a blood discharge from the vagina. No clots, however, were passed.

After this attack the patient felt no more movements, and the tumour ceased growing.

About the middle of October, 1919, there was a blood discharge from the vagina, lasting for 12—13 days, but no pain.

About the middle of November and also again in December, she had a similar blood discharge from the vagina, lasting on each occasion for 5—6 days.

On abdominal examination a tumour was felt rising out of the pelvis rather more on the right side. The tumour felt like a pregnant uterus. What appeared to be fœtal parts were detected. No fœtal heart sounds could be heard. *Per vaginam* the cervix was high up and not softened. The uterus appeared to be separate from, and lying behind the tumour.

On December 31st, under chloroform, the abdomen was opened by a left paramedian incision extending from the symphysis to just above the umbilicus. A tumour presented, the size of the full-time uterus, slightly adherent to the parietal peritoneum; there were also omental adhesions to it. The omental adhesions were separated after ligature, the other adhesions being easily separated with the gloved hand.

The tumour could now be delivered out of the wound after extending the incision a little upwards. It was attached by a pedicle about $\frac{1}{4}$ inch thick and $2\frac{1}{2}$ inches wide, growing apparently from the upper part of the left broad ligament rather anteriorly. The pedicle was clamped and cut, and the tumour removed.

The left ovary and tube, which were somewhat ragged from adhesions to the tumour, were removed.

After the vessels in the pedicle had been ligatured the raw surfaces of the broad ligament were covered with peritoneum. The appendix, right tube, ovary and uterus were all normal and healthy.

About 1½ pints of normal saline solution were poured into the abdomen and the incision was then closed in layers.

Parts removed :—

i. A tumour, about the size of a full-time uterus, covered everywhere with a smooth coating. On opening this about two pints of dark liquor amnii escaped. A dead female fœtus, somewhat macerated, weighing 3 lb. 12 oz., was delivered, apparently full-time and not deformed in any way. The placenta was somewhat thickened, and weighed nearly 2 lb. The cord measured 12 inches.

ii. The left ovary appeared complete and quite separate from the sac. It was rough on the external surface from adhesions to the sac.

iii. The left Fallopian tube appeared complete and normal except for roughness from adhesions.

The patient made an uninterupted rocovery, and was discharged on the 28th January, 1920, at which time the abdominal scar was soundly healed and firm. Vaginal examination showed that the uterus was in good position and there was nothing abnormal to be felt in either fornix.

The first case appeared to be one of secondary abdominal pregnancy of the intraligamentary variety.

The second one possesses several points of great interest. The fœtus was contained in a sac with a very definite pedicle, only slightly adherent to its surroundings, and was removed as easily and simply as an ordinary ovarian cyst. Indeed it resembled this condition more than anything else.

In each case there was a history of spurious labour at or after term, and in each case the fœtus appeared to be fully developed, and neither showed signs of any obvious deformity.

A portion of the pedicle and of the sac wall were sent to Dr. Cuthbert Lockyer, who examined the specimen microscopically, and reported that it consisted almost entirely of uterine muscle, and that it was apparently a case of pregnancy in a uterine cornu. At the operation the uterus appeared to be quite normal and the pedicle did not appear to be growing from it.

A Case of Perforation of the Uterus by a Foreign Body.

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B—— B——, a Bengali female. Aged 17 years. Admitted 24/12/21 to the Eden Hospital complaining for the last eight months of severe pains in the lower abdomen accompanied by fever. The history the patient gave was that 8–9 months ago she had an abortion, and shortly after, whilst trying to lift a pitcher of water, she was suddenly seized with pain in the lower abdomen and back, which has become more and more severe. She has noticed a swelling in the lower part of the abdomen and a discharge of pus from the vagina for the last six months. She has had no children. Menstruation has been regular each month, lasting five to six days and painless. She has had no period for the last six months.

On examination, there was a tender, hard, indurated mass rising out of the pelvis reaching to about $2\frac{1}{2}$ inches above the symphysis in the middle line and measuring about 3 inches from side to side. The whole abdomen was somewhat distended, both flanks were resonant. On vaginal examination the uterus was found lying anteverted and rather fixed. There was a hard, sharp, narrow band running backwards from the uterus towards the sacrum and another forwards to the indurated mass which appeared to lie in front of the uterus. The temperature was 100·5°F. The blood count showed a leucocytosis of 8,000 (polynuclear 68%, small mononuclear 28%, large mononuclear 4%). The patient was kept at rest in bed. The temperature was irregular, varying between 97° and 100°. The abdominal swelling slowly decreased in size, until on the 27 January, 1921, it only reached $1\frac{1}{4}$ inches above the pubes and measured $1\frac{1}{2}$ inches from side to side. The condition on vaginal examination was the same. She still complained of a great deal of pain. On February 15th the induration was a good deal less definite, but otherwise there was no change. As there was still a slight irregular temperature it was thought better to postpone any interference. On the 19th of March the abdomen was opened by a left paramedian incision and considerable induration with great thickening of the peritoneum in the lower part was found, and the omentum, which was attached to the anterior abdominal wall low

down just above the pubes, was ligatured and divided. There were no other adhesions. On exploring the pelvis a foreign body was detected which proved to be a small stick about 6 inches long and $\frac{1}{8}$ inch in diameter protruding from the uterus just posterior to the uterine end of the left Fallopian tube and from there penetrating into the abdominal wall for a distance of about $\frac{1}{2}$ inch to the left of the middle line a short distance above the pubes. The stick was removed, and a wedge-shaped piece of uterus, including the perforation, was excised, the wound being closed with two deep silkworm gut and superficial catgut sutures. The wound in the abdominal wall was closed in layers. Both tubes and ovaries were normal. The abdominal wound was closed in layers. Some difficulty was experienced in closing the peritoneum at the lower part as it was so thickened.

There was slight fever on the first two days and on the third day it rose to 104°, and the abdominal wound suppurated superficially and had to be opened up and drained. The temperature fell rapidly, and after the eighth day was only once above 99·4°, until finally on the 14th day it fell to normal and the wound healed. Cultures of the pus from the abdominal wound showed a mixed growth of staphylococci and bacillus coli. The patient was discharged on April 3rd, on which date the wound was soundly healed and firm. The uterus was lying in good position and there was nothing abnormal to be felt on either side.

A Case of Carcinoma of the Uterus Originating in an Adenomyoma.[1]

By H. Russell Andrews, M.D., F.R.C.P. (Lond.),
Obstetric Physician to the London Hospital.

The patient was a single lady of fifty-two, who was sent to me in November, 1920, on account of loss of strength and energy and recurrence of bleeding after the menopause. The menstrual periods stopped completely three years previously after almost continuous bleeding for a year. In July 1920 there was slight bleeding. In September there were four weeks' bleeding, with a flooding at the end of it. There had been no bleeding for a month before I saw her. She was well-nourished and had not lost flesh. She complained that for five or six months she had felt tired and had some pain in the right iliac fossa. Lately there had been " neuralgic pain " in the lower abdomen. Nothing abnormal was found on abdominal examination. On bimanual examination the cervix was found to be normal; the body of the uterus considerably enlarged. On examination under an anæsthetic, the body of the uterus was found to be as large as three months' pregnancy. I thought that the condition was probably carcinoma of the body of the uterus with fibroids, and proceeded to perform hystecetomy. The operation was a very difficult one, as the rectum was adherent to the back of the uterus and the parametrium was dense and inelastic, making dissection difficult. The pelvic peritoneum was studded with minute nodules resembling miliary tubercles. Both tubes were considerably enlarged and contained caseous material. The patient made a good recovery, and when seen recently, five months after the operation, was in very good health.

Naked-eye Description of the Uterus and Tubes.—The uterus measures 12 × 9·5 × cms. The peritoneum is covered with coarse fibrous tags and has scattered over it raised solid pink nodules of various sizes, most of them very small. The wall is soft, except in the fundus and the right cornu where there are two rounded nodules which on section show a pink-and-white whorled surface and a few small cystic spaces. The endometrium is smooth and thin. The cavity of the uterus is irregular and enlarged. Both tubes are thickened and contain white or grey caseous material.

1. Read in the Section of Obstetrics and Gynæcology, Royal Society of Medicine, May 5th 1921.

On naked-eye examination, as the endometrium was healthy, I hoped that there was no malignant disease, but microscopical examination showed that although the endometrium was healthy there was carcinoma in adenomyoma.

Microscopical Examination.—The endometrium is atrophic and shows no malignant change. Sections taken from various parts of the uterine wall show carcinomatous change in the adenomyoma. A few small areas of unchanged adenomyoma can be found. The nodules seen in the peritoneum consist of tubular or solid columnar-celled carcinoma. Both Fallopian tubes are filled with the same growth.

Cases of adenomyoma becoming carcinomatous with no carcinomatous change to be found in the endometrium are very rare. Cullen[1] says, "In spite of a rigid search I have failed to find among our own cases a single instance in which an adenomyoma has become carcinomatous." Lockyer, in his "Fibroid and Allied Tumours," quotes a few cases and says, that "adenomyomata may become malignant, but they do so very rarely."

The section was referred to the Pathology Committee of the Section, which agreed with the author that the case was one of carcinoma originating in an adenomyoma.

1. "Cancer of the Uterus," p. 410.

Two Cases of Placenta Prævia associated with Albuminuria, with a note on the danger of relying on Albuminuria as a diagnostic point between Placenta Prævia and Accidental Hæmorrhage.

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My attention was first drawn to the association of albuminuria with placenta prævia by Dr. James Young and Dr. Douglas Miller, in a paper published in the Proceedings of the Royal Society of Medicine, Section of Obstetrics and Gynæcology, vol. xiv, No. 5, March 1921. They record that they found albuminuria in five out of ten consecutive cases of placenta prævia, and that there were other symptoms of toxæmia in three of the five: they suggest that the association may be much more common than is at present supposed.

In the Proc. Royal Soc. Medicine, Obstetrical and Gynæcological Section, 1920, vol. xiii, p. 132, I reported "A case of combined antepartum hæmorrhage: placenta prævia and accidental hæmorrhage." There was no difficulty in arriving at the correct diagnosis in this case, for the physical signs were unmistakable; the placenta was felt partly covering the os uteri, and the physical characters of the uterus and the state of the patient were those of a moderate concealed accidental hæmorrhage; the urine contained a dense cloud of albumen. Examination of the placenta revealed a typical, sharply-localized, depressed area, with flattened cotyledons, in the middle of the maternal surface. Some dark clot occupied parts of this depressed area, and a closer inspection revealed some adherent laminæ of clot of greater age. The opening in the bag of membranes was at the margin of the placenta. This was a freak case: the chance association of toxæmic retroplacental hæmorrhage with a placenta prævia. As placenta prævia occurs about once in one thousand, and accidental hæmorrhage about once in five hundred cases, the combination of the two should occur about once in half a million cases.

Such a case is in a class by itself, and is in quite a different category to cases of placenta prævia associated with albuminuria, but in which no evidence is to be found of retroplacental hæmorrhage or hæmatoma.

Two such cases have recently come to my notice. I have thought it worth while to report them, especially as one of them illustrates the dangerous consequences of relying on the presence of albuminuria in cases of antepartum hæmorrhage for making the differential diagnosis between accidental hæmorrhage and marginal or lateral placenta prævia. There is a tendency, by some observers, to place too great reliance on this point, especially since the renewed interest taken in the subject of toxæmic accidental hæmorrhage following the publication of Gordon Ley's recent paper. The presence of albuminuria is doubtless of assistance, but the following cases illustrate the folly of placing too great reliance upon it, and of breaking the time-honoured rule to examine carefully all cases of antepartum hæmorrhage when first seen, if necessary giving an anæsthetic and introducing the finger through the cervix to feel if the placenta is in the lower uterine segment, and if so to begin active treatment at once.

Case I. E. C., age 34, ii-gravida, last menstrual period 18/vii/1920, admitted in 7/iii/1921, with a history of having had slight hæmorrhage. On admission the patient was in excellent condition, the uterus corresponded in size to a pregnancy of 34 weeks' duration and was not tense or tender, the fœtus was easily palpated and was alive, and there was no hæmorrhage. The cervix was not dilated, and a note was made " ? placenta felt through the anterior fornix." The *urine was found to contain a thick cloud of albumin, so the diagnosis of accidental hæmorrhage rather than of placenta prævia was made.* In accordance with this diagnosis, and as there was no further hæmorrhage, the patient was treated expectantly and for toxæmia, *i.e.*, a tight abdominal binder was applied and she was given a semi-starvation fluid diet and saline aperients. On 9/iii/1921, the albumin was 4 parts per 1000 (Esbach); on 10/iii/1921, 3 parts per 1000, and on 11/iii/1921, 2 parts per 1000. Up till then there had been no further hæmorrhage, but on 11/iii/1921, at 5.30 p.m., the patient had a sudden and profuse hæmorrhage which was apparently coincident with the onset of labour-pains. She was at once examined under an anæsthetic, and a marginal placenta prævia was revealed through an os uteri dilated to the size of a florin. The membranes were ruptured and bipolar version performed; a foot was brought down and a 2 lb. weight attached. A good deal of hæmorrhage accompanied these manipulations. At 10.30 p.m. a dead fœtus was born, there was no post-partum hæmorrhage, but the patient was in poor condition. At 3 a.m. on 12/iii/1921, the patient became more collapsed, though there was no bleeding; she died at 8 a.m., in spite of saline infusions and stimulants. I examined the placenta and membranes. The bag of membranes was intact, except for the opening through which

the fœtus had passed; the situation of the opening was typical for marginal placenta prævia—it was bounded on one side by the edge of the placenta. On the maternal surface there were no depressions and no traces of adherent blood-clot, *i.e.*, there was no evidence of retroplacental hæmorrhage or hæmatoma.

Case II. F. C., age 27, iii-gravida, last menstrual period 30/ix/1920. Admitted at 5 a.m. on 4/vii/1921. For a week she had had slight bleeding off and on, and on the morning of admission had passed a large clot. She was in excellent condition and was not bleeding. The fœtal head was engaged in the pelvis and there were no labour pains. The note was made, "*she was found to have marked albuminuria; probably not placenta prævia, so not examined vaginally.*" The amount of albumen was 1 part per 1000 (Esbach). Labour began at 8 a.m. and she delivered herself spontaneously of a living infant at 12 noon. Hæmorrhage was very slight during labour. Much hæmorrhage accompanied the third stage and continued after expulsion of the placenta. A small piece was found missing from the edge of the placenta, so the fingers were introduced into the uterus and a small piece of adherent placenta was removed from near the cervix. All hæmorrhage stopped after a hot intrauterine douche and 1 cc. of pituitrin. The opening in the bag of membranes was found very near the edge of the placenta, the maternal surface of which revealed no depressed areas or retroplacental clot. The patient made a smooth recovery; on 7/vii/1921 the urine contained $\frac{1}{2}$ per 1000 of albumen, and on 15/vii/1921 a faint trace.

I make no scientific comment on these cases, but have merely recorded them for their clinical value. The association of albuminuria with placenta prævia may be only an occasional and chance one or, on the other hand, may be much more common than we have hitherto suspected.

A Case of Central Placenta Prævia Associated with Post-Partum Eclampsia.

By Douglas Miller, M.B., Ch.B. (Edin.),
Resident Surgeon, Royal Maternity Hospital, Edinburgh.

In view of the unusual nature of this case, it has been thought worthy of record.

The patient, a vi-para, had been bleeding intermittently for a month, and more or less continuously for a week. When admitted she seemed almost moribund from loss of blood. The os was nearly fully dilated and completely covered by placenta. The urine contained a trace of albumen. Version was performed and the child and placenta slowly delivered, treatment for the bloodless state being carried out in the usual way. At this stage the patient was very collapsed, but later rallied. The improvement was maintained next day, but twenty-four hours after delivery, restlessness, severe frontal headache and epigastric pain developed, and the urine showed an increase in the amount of albumen. Thirty-six hours after delivery a convulsive seizure occurred followed by coma, from which consciousness was not regained.

Post-mortem, the kidneys and liver showed the focal necroses and interstitial hæmorrhage that are the characteristic changes associated with eclampsia. The separated portion of placenta was greatly engorged, and microscopically the appearances were those of recent red infarction, congestion and close packing of the villi being present, with coagulation in the intervillous spaces.

The interest of this case lies in the occurrence of eclampsia in a multipara and in its being associated with placenta prævia.

Involvement of the placental circulation as an ætiological factor in the production of toxæmia was first suggested by Young in 1914. The comparative rarity of eclampsia in association with ante-partum hæmorrhage was explained by the fact that such labours as a rule terminate quickly, before sufficient time has elapsed for the formation of toxic products. A mild toxæmia, however, is not uncommon, and in a series of eleven cases of placenta prævia observed by the writer during the past nine months, albuminuria of a greater or less degree was present in six. In two of these the toxæmic symptoms were severe.

That an acute toxæmia in this case should not have appeared earlier is explained, on the grounds of the theory mentioned above, by the fact that not till late in labour was placental separation on a scale sufficiently large to allow of the intense toxæmia which caused the death of the woman.

I have to thank Dr. Barbour for permission to report this case.

A Case of Hydatidiform Mole associated with Toxæmia.

By C. E. Lloyd, M.C., M.D.(Durham), Hexham.

The following case presents several points of interest, and seems worthy to be recorded.

The patient, M. K., a woman of 24 years of age, first consulted me in November 1920. She was then pregnant one month, the last menstrual period being October 12 to 19. She complained of severe vomiting, and stated that she had not been very well all through the previous summer, that she had lost weight and had been short of breath and listless. There was then no œdema. The urine was normal. The vomiting did not yield to ordinary treatment and continued up to the end of the third month. The urine was again examined about the end of January and contained no albumen.

On February 6th she first noticed swelling in the legs. About this time too she became very short of breath, and had some headache.

On February 9th examination showed well-marked œdema of eyelids, face and legs. Pulse 120. Temperature normal. Heart apex 5th space inside nipple. No murmurs. Urine sp. gr. 1018, contained large quantity of albumen, numerous tube casts, epithelial cells, a few leucocytes and red blood cells.

She has one child, aged 5 years. Normal labour. No miscarriages, and no other illness of any note.

Subsequent progress. She was put to bed and kept on milk diet. There was very little improvement in her condition. The pulse remained about the same rate, and she continued to be breathless. Œdema disappeared from the legs and almost entirely from the face, but became very marked in the back, extending from the buttocks up to the middle of the scapulæ. Urine still contained a large quantity of albumen and tube casts. The average amount passed was about 15 oz. to 20 oz. per diem.

On March 4th the patient stated that she was much better, that the œdema was less, and she passed considerably more urine than she had done previously. It is probable that this corresponded with the death of the fœtus.

On March 5th, at about 5.30 a.m., the patient began to get very severe pains in the right side of the abdomen low down towards the groin. Pains were spasmodic in character, but were never entirely absent. On examination at 7 a.m. the fundus of the uterus was just above the umbilicus. The external os was dilated and the cervix relaxed. The internal os would just admit

one finger. No presenting part or bulging membranes could be felt. Pains continued all day, being more marked in the back. At 9 a.m. very little progress had been made. At 12 midnight, as the patient was becoming exhausted, it was decided to anæsthetise, dilate the os digitally, and empty the uterus. Ether was given and the os, which would now admit two fingers, was gradually dilated. A well-marked contraction ring was felt in the lower uterine segment. What was thought to be the edge of the placenta was felt on the right. This was separated as far as the fingers could reach. There was some hæmorrhage, but nothing alarming. Some placental tissue which came away was composed of cystic material, and the case was recognised as being one of hydatidiform mole. The fœtus next came away and the rest of the mole which filled the uterus was gradually separated and delivered. There was practically no amniotic fluid. A rough surface was felt in the uterus, but this could not be completely cleared owing to the firm contraction of the uterus. The patient was very much collapsed afterwards, and resuscitation methods had to be adopted. Delivery was effected about 2 a.m. on the 6th. The patient was fit to be left at 5 a.m.

Fig. I.
Hydatidiform Mole with Fœtus 7 inches long.

The specimen (fig. 1) consisted of a large hydatidiform mole, to which the fœtus, measuring about 7 inches long, was attached. The cord, on entering the mole, broke up into numerous strands which were distributed throughout the mole.

The Pathological Report is as follows:—"The histological appearances confirm the opinion that this specimen is a hydatidiform mole. The chorionic villi are greatly bloated from myxomatous change in the stroma which contains very few blood vessels. The chorionic epithelium shows no undue proliferation and nothing to indicate a chorion-epitheliomatous change. A portion of blood-clot was examined which contained numerous myxomatous chorionic villi, many of which are necrotic. There is no trace of normal placental tissue. A portion of the umbilical cord—near its insertion into the mole—still shows patent umbilical vessels without any evidence of thrombosis."

On March 7th pulse was 110 m. 120 e. Temperature 98° m. 100 e. The patient complains of pain in the right groin. There is a fusiform swelling in the right iliac fossa going down into the pelvis, which appears to be separate from the uterus. It is very tender. There is no rigidity of the abdominal muscles.

March 8th. Pulse 116 m. 110 e. Temperature 99·6 m. 99·8 e. Swelling, pain and tenderness still present. The patient looks better.

March 9th *et seq.* Pulse 112 m. and 116 e. Temperature 98 m. and 99·2 e.

The pulse gradually became normal, and the temperature remained normal for the rest of the time.

March 14th. There is still some discharge.

Eyes. For a week or ten days before miscarriage the patient complained of indistinctness of vision. The fundi were not then examined. The indistinctness of vision has almost entirely disappeared, but patient says she cannot read. On examination there are signs of albuminuric retinitis in the right eye consisting of rounded white spots between the disc and macula. Nothing abnormal can be seen in the left eye.

March 19th. Urine (catheter specimen) is clear; sp. gr. 1020. Fair quantity of albumin present, and centrifugal deposit contains finely granulated tube casts, epithelial cells and a few leucocytes. No sugar.

On April 2nd albumin amounted to 1/7th and on April 9th to about 1/30th.

On April 11th the patient began to menstruate.

April 25th the patient seemed quite well. There was no œdema, and she had been getting out for the last few days.

At the beginning of June there was still a slight trace of albumin present. Menstruation has been regular and normal.

This case seems of interest on account of the association of hydatidiform mole with the ordinary albuminuria of pregnancy, and also from the fact that although the whole chorion was affected yet the fœtus survived over four months.

In conclusion, I wish to thank Dr. Fairclough for the administration of the anæsthetic in very difficult circumstances, and Mr. Wardill for mounting the specimen and helping with the photograph; also Dr. Bernard Shaw for the histological report.

Twin Pregnancy with Anencephalic Fœtus showing Unilateral Development and Numerous Deformities.

By Reginald G. Hann, M.R.C.S., L.R.C.P. (Lond.).

The patient, a woman of 38, whose youngest child was four years old, expected her fourth confinement on January 17th. Her pregnancy was notable for the rapidity with which the abdomen increased in size towards the end of her time and the undue amount of discomfort and feeling of illness arising therefrom. Increasing with this enlargement there was œdema of the legs and feet, but at no time did albumen appear in the urine. On December 5th she had so much abdominal pain and felt so ill that she kept to her bed. There was no fever. The abdomen was greatly distended, measuring 41½ in. at the level of the umbilicus, and on palpation it was clear that a good deal of this was due to fluid in the uterus. Rhythmical contractions of the uterus were noticed. In the left upper quadrant of the uterus the legs of a fœtus could be recognised, and here fœtal movements were vigorous and frequent; in the same neighbourhood, by sharply displacing the fluid with the flat fingers, the mass of the fœtus could just be touched, but as on the lightest stroke it sank out of reach no head or breech was to be recognised. In contrast with this on the right side, and low down, a leg with a fœtus behind it was closely applied to the abdominal wall and was immovable to manipulation: no head or breech could be distinguished: no fœtal movements could be felt; it was a fœtus and not a myoma, for the limb was unmistakable.

It was plainly a twin pregnancy with hydramnion; the presentations could not be determined.

On December 9th labour began at 10 p.m., a female presenting by the breech was born at 2.30 a.m. The membranes had previously ruptured and the amount of liquor amnii could not be estimated. The placenta was expelled unaided about 2.45 a.m., and the anencephalic fœtus enclosed completely in its amnion about 3 a.m.; there was no amniotic fluid with this fœtus—the membrane was closely applied and everywhere intact. The female, induced to breathe after mouth-to-mouth insufflation, other methods having failed, died six hours later. It weighed 4 lbs. 2 oz., and had no deformities.

The main features of the fœtus are well shown in the accom-

panying sketch. It measured 8 in. in length, and weighed 900 grammes. The left side was better developed throughout. Its extreme rigidity at birth was then attributed to rigor mortis, but it never passed off, and seemed due to the non-development of the joints. The vertebral column was short; there was no defined neck, the face looked upward. The vault of the skull and the brain were wanting; at the base of the skull was a mass of granulation-like tissue covered by fine membrane (not skin) reaching behind to a deficiency in the vertebral arches extending half the length of the fœtus. The right eye and ear were rudimentary; the left are represented by little more than dimples. The tongue protruded; there was hare-lip and cleft palate. There was a patch of hair on the chest and another near the base of the skull. The legs were extended, but for some adaptation to one another as they lie crossing (the right leg was evidently the one so easily felt before birth close under the abdominal wall). The scrotum was quite well developed there was no penis or perineum, the rectum opening immediately behind the scrotum (Fig. II). In the sacral region a dimple marked the site of a spina bifida.

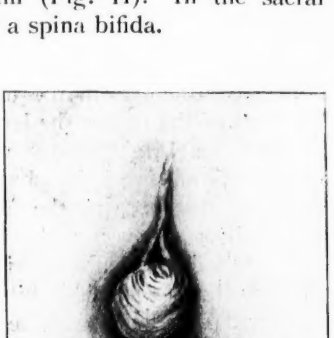
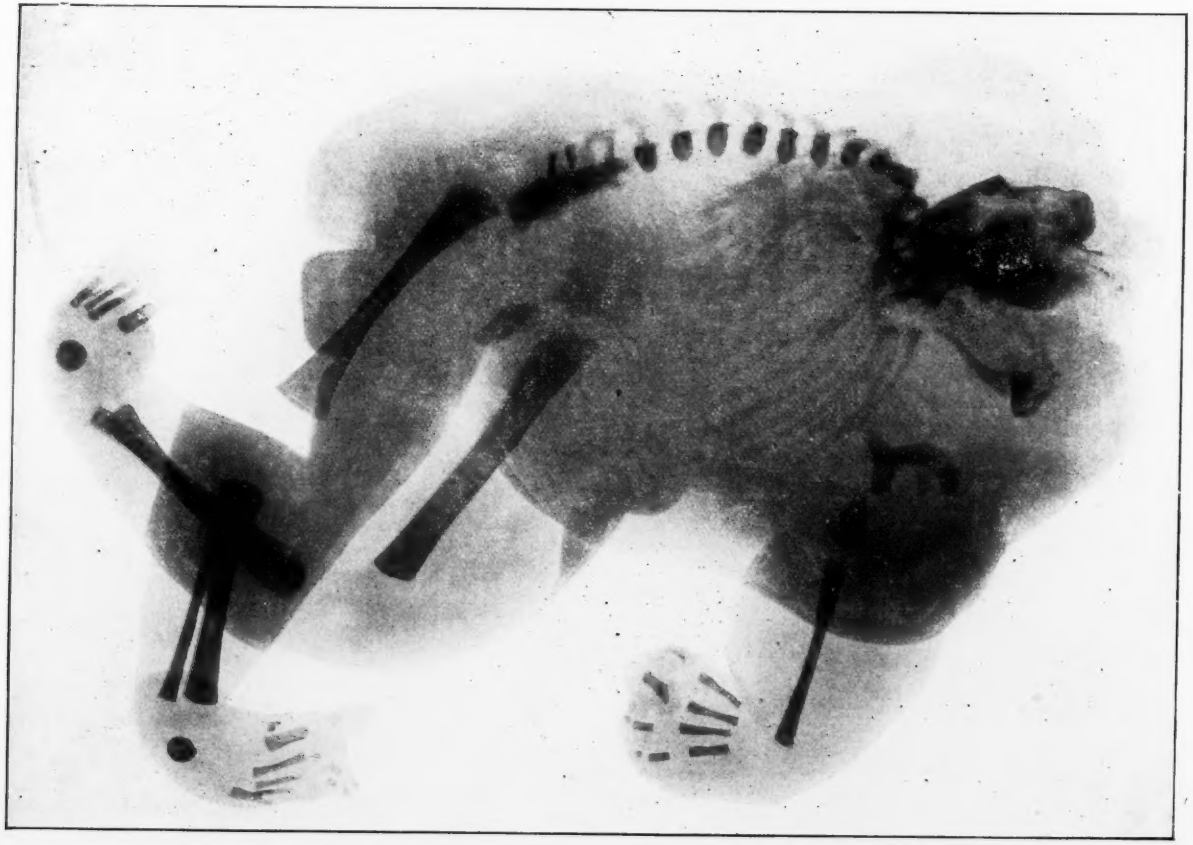


Fig. II.

The radiograph shows the entire absence of the right fore-quarter. In the left arm the humerus is rudimentary and the radius is wanting. There are no carpal bones and the os calcis is the solitary representative of the tarsus. The placenta, measured roughly 8 in. by 8 in., and weighed 770 grammes. There was a single chorion and two amnions. The two umbilical cords were inserted within two inches of one another; that to the baby was immensely thick, and was 15 inches long; the other, of very small calibre, was 5 inches long.

Fig. I.



After the labour the uterus for two days reached 7 to 8 inches above the pubis; on the fourteenth day it was still about 1½ inches above, and the twentieth day was noted as the first on which it could no longer be felt. The mother's convalescence was uneventful, and she was up and about at the end of a fortnight.

The anencephalic fœtus is catholic in its associations. It appears as a single birth and as a twin; it may be the first-born of a young mother or the offspring of an elderly primigravida; though it commonly leads to premature confinement it may be post-mature and give rise to dystocia from its growth; it is seen with and without excess of amniotic fluid; the anencephalus may be the only error of development or other deformities may co-exist.

Unequal growth of twins tends to hydramnion affecting the larger; a further degree of the inequality in the earliest months leads to death of the smaller and to the condition known as fœtus papyraceus. Hydramnion is a common accompaniment of any unioval twin pregnancy—like the case now recorded—apart from the presence of any monstrosity.

Two published cases may be briefly referred to. Dr. Ballantyne, in one of three records of post-mature anencephalic fœtuses, reports that a confinement due at the beginning of April took place only on June 13th, when a male anencephalic fœtus, weighing 9 lbs., was born: there was no hydramnios. Dr. Dickenson recorded the birth of a healthy female twin with a male anencephalic monster without heart, lungs or liver.

1. J. W. Ballantyne, *Jour. Obs. and Gyn. Brit. Emp.*, Dec., 1902.
2. W. H. Dickenson, *Med. Chi. Trans.*, 1863.

"Seven Children" at One Birth.

A FEW details of this unusual occurrence, which was reported in the press at the time, have been forwarded to the Editor by J. B. Davey, M.B., London, D.T.M., Liverpool.

It appears that one evening whilst the flagship "Highflyer" was at Dar-es-Salaam, the officers gave a dance. On returning early in the morning the M.O. of the European Hospital was called to a Goar woman because her placenta had not been expelled and there was a good deal of bleeding. This latter circumstance, together with the fact that the room was small and the light bad, claimed all his attention, and although, as he said afterwards, he "noticed a pile of still-born infants," he did not count them.

A few hours later Dr. Scott, the energetic M.O.H., having heard that a Goar woman had given birth to seven children, went to the house and counted five fœtuses, all laid out and decorated with flowers. Asking where the other two were, he was told by the parents that they were so small they had not troubled to keep them.

Unfortunately Dr. Davey did not hear of the occurrence till late in the day by which time the remaining fœtuses had been buried. At any rate there is no doubt that there were five fœtuses, as the Medical Officer of Health of Dar-es-Salaam himself counted them.

A further interesting point about the case was that the woman had been assured, at the Hospital a month before, that she was not pregnant, but had a tumour.

Obituary.

FRANCIS W. N. HAULTAIN, M.D., F.R.C.P.E.,

Consulting Obstetrician, Edinburgh Royal Maternity Hospital; Gynæcologist, Deaconess Hospital, Edinburgh, etc.

On Saturday, July 23, the funeral of Dr. Haultain took place from the Dean Parish Church to the adjacent Dean Cemetery, Edinburgh. In the church there was a large gathering of medical men and others representing the various public bodies and hospitals with which Dr. Haultain had been long and honourably connected. The service, which was conducted by the Very Rev. A. Wallace Williamson, D.D., the Rev. R. H. Fisher, D.D., and the Rev. James Reekie, B.D., of the Dean Church, was an impressive one, beginning with Chopin's Funeral March and closing with the Dead March from "Saul." It was felt by all that in the passing of Dr. Hultain the Edinburgh Medical School had suffered no slight loss and that many circles in the city were seriously impoverished; to his personal friends, and he had many, there was real bereavement.

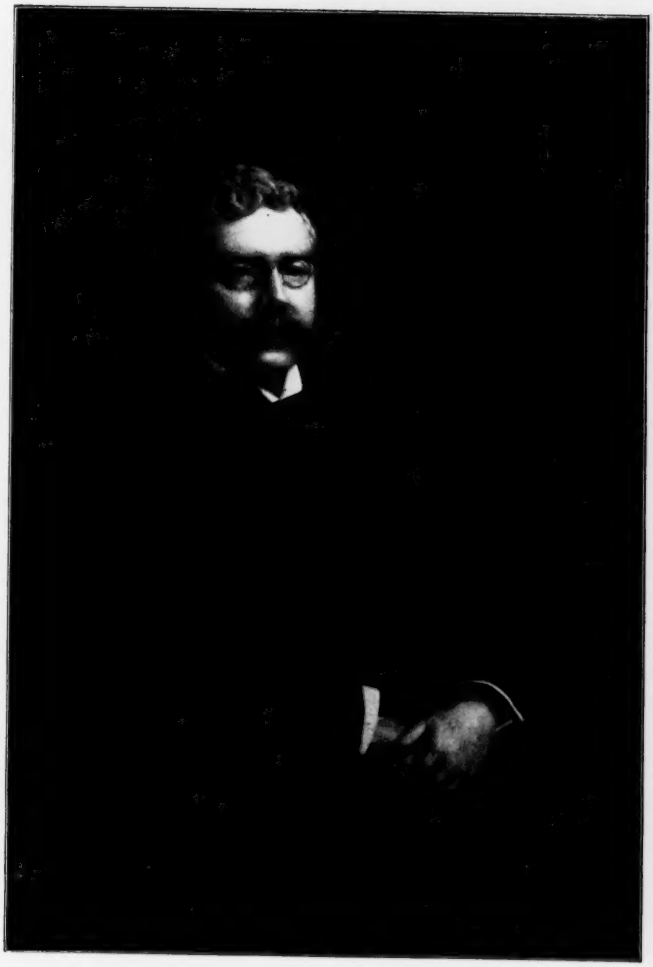
Francis William Nicol Haultain was born in Colombo, Ceylon, in June 1861. He received his school education in Craigmount, Edinburgh, and he had a distinguished career in the University of that city, graduating M.B., C.M., in 1882. After some time spent in the medical centres of Germany and Austria Dr. Haultain settled in Northumberland Street, Edinburgh, and made a beginning as a specialist in obstetrics and gynæcology, subjects with which his name was to be honourably connected in the years to come. For a time he assisted Sir (then Dr.) Halliday Croom, and it was during these early years that he obtained (by examination) the Membership of the Royal College of Physicians in 1887, and the Fellowship of the same body in 1888. In 1889 he proceeded to the degree of M.D. in the University, the subject of his thesis being "Necrosis of the Bladder following upon Retroversion of the Gravid Uterus." In 1884 he became a Fellow of the Edinburgh Obstetrical Society, and his name soon began to appear among those who contributed to the *Transactions* of this body, then in a very active condition, under the Presidentship of Drs. John Connel and Halliday Croom. The first of many specimens which Dr. Haultain was to exhibit in that Society was an exfoliation of the entire mucous membrane of

the bladder, shown on May 25th, 1887; and one of the first papers which he read was on the morbid anatomy of the Fallopian tubes, in July, 1890. In this paper he demonstrated that simple contortion of the tube manifesting itself as a spiral angular bending was very common, that it was either congenital or acquired, the former being a maintenance of the normal fœtal condition, and that when associated with surrounding inflammation it was more probably the cause than the result of that process. Another early communication was made in 1891 on the treatment of eclampsia during pregnancy, and in it Dr. Haultain strongly advocated rapid manual dilatation of the cervix and the termination of the labour by forceps. In 1892 Dr. Haultain began to exhibit the first fruits of his fearlessness in operating and of that technical dexterity which were later to bring him so great a reputation; for, on July 13th, 1892, he showed a uterus removed by the Porro-Müller method of Cæsarean section, the patient being a deformed dwarf, the place of operation a small cottage in the country, and the result the saving of both mother and child.

In 1891, Dr. Haultain began his career as a Lecturer on Midwifery and Gynæcology in the School of Medicine of the Royal Colleges, and continued to attract there large classes for a long series of years.

In association with Dr. Haig Ferguson he had already published (in 1889) a Handbook of Obstetric Nursing, a work which immediately became popular among monthly nurses and ran through a number of editions in this country and in America; and five years later he put forth his admirable *Practical Handbook of Midwifery*, excellent in its subject matter, in its conciseness, and in its clarity, and revealing to some extent the cause of the attraction which his teaching had upon the undergraduates of the time. His fame as a teacher and lecturer reached a high level when, during the illness of his friend, Dr. Milne Murray, he took over the work of both classes, and taught with great acceptance the large number of students attending. When, in 1900, he was appointed Assistant Physician to the Royal Maternity Hospital, and when, some four years later, he became one of the Senior Physicians to the same institution Dr. Haultain's power of clinical teaching were revealed in their full vigour; and he was never seen to greater advantage than when demonstrating obstetrical details at the bedside to the students occupying the Milne Murray Lodge in connection with the Hospital. During these years also he was appointed one of the Assistant Gynæcologists to the Edinburgh Royal Infirmary, a post he had soon to resign on account of his rapidly developing private practice.

Meanwhile Dr. Haultain was quickly increasing experience and



THE LATE FRANCIS W. N. HAULTAIN, M.D., F.R.C.P.E.

gathering fame as an operator. First in his small Nursing Home in Lauriston Place, and later in the Hospital for Diseases of Women in Archibald Place, he began that long series of hysterectomies for fibroid tumours of the uterus in which he achieved so signal a success and brought so great credit to the Edinburgh School of Gynæcology. He was among the first to replace the electrical treatment of myomatous growths by sub-total abdominal hysterectomy with an advantage that was at once apparent and with a mortality so low as almost to be negligible (see his "Analysis of a Consecutive Series of 120 Abdominal Hysterectomies for Uterine Fibromyomata," publish in this JOURNAL in 1905). His communications on obstetric subjects were also important and numerous; and from 1893, when he became Secretary to the Edinburgh Obstetrical Society, there was hardly a year in which the *Transactions* were not enriched by one or more papers from his pen, and hardly a meeting at which he did not show some interesting specimen. Outstanding articles dealt with the subjects of malignant complications of fibro-myomata of the uterus, with serum treatment of puerperal infection, with axial rotation of the female pelvic organs, with ectopic pregnancy, with thirty cervical fibroids removed by abdominal hysterectomy, with pregnancy complicated by fibro-myomata of the uterus, with adenoma of the vagina, and with eclampsia treated by veratrone. On two more controversial matters—early rising in the puerperium and the "twilight sleep" in labour—Dr. Haultain wrote with enthusiasm; and among his patients—hospital and private—he practised what he preached with steady loyalty to the views which he had formed.

His operative work brought him into touch with chorion-epithelioma, and his demonstration of the pathology and histology of that growth given to the Edinburgh Pathological Club was masterly and impressive. But although he wrote on many subjects, there were three which engrossed his later years and on which he was always eloquent and convincing, and they were fibroid tumours of the uterus, early rising after abdominal operations and in the puerperium, and scopolamine-morphine in labour. To each of these subjects he made a distinct contribution.

During the thirty-nine years which intervened between Dr. Haultain's graduation and his death he was called upon to occupy not a few positions of responsibility and honour. After acting for several years as Librarian he was called upon to be Vice-President of the Edinburgh Obstetrical Society in 1901, and he filled the Presidential Chair in the two sessions 1909 and 1910. His teaching and his contributions to the literature of obstetrics and gynæcology soon made Dr. Haultain much sought after as an Examiner, and in that capacity he served the Universities of Aberdeen, Durham,

Edinburgh, Manchester and Oxford. He was also for many years one of the Examiners for the Licence and for the Membership of the Royal College of Physicians of Edinburgh, and he was on the Board of Examiners for the Midwives' Diploma in Scotland. In his later years the Fellows of the College of Physicians elected him one of their two representatives on the Board of Management of the Edinburgh Royal Infirmary; and he was made a Consulting Obstetrician to the Edinburgh Royal Maternity Hospital on the conclusion of his term of service to that institution in 1919. He was likewise in request as a skilled witness in medico- or rather in obstetrico-legal cases. Behind all these various activities he had the supervision of a large and influential clientéle of patients who were devoted to him and to whom he responded by giving of his best.

To his intimate friends Dr. Haultain was something more than the successful teacher and the expert operator. To them in the intervals of his work he revealed himself as the genial companion and constant friend; and to them also were given glimpses of the Haultain of the cricket field, of the golf links, of the river side, and of the heather-clad hills, and in all these rôles he was an attractive figure as well as an enthusiastic sportsman.

One never much associated illness with Dr. Haultain; he seemed endowed with abundant energy and vitality; but during the past winter he began to complain of asthma, and on the advice of his medical man he set out on a voyage to the Canary Islands. He suffered, however, from a bad heart attack on the way there, and was brought home seriously ill in the end of June. He recovered sufficiently to see again the city of his affection, but the end could not be delayed long, and on July 20 he finished his course.

His widow, who was also his cousin, was the only daughter of the late Dr. W. Lauder Lindsay, of Perth, a noted alienist. His only son, Dr. W. F. Theodore Haultain, has adopted his father's speciality, and was recently appointed Assistant to the Professor of Midwifery in the University of Aberdeen. J. W. B.

Review of Current Literature.

THIS Review will contain the lists of contents, and abstracts of the more important articles, from the following journals, with which the "Journal of Obstetrics and Gynæcology of the British Empire" exchanges:—

British.—Lancet, British Medical Journal.

American.—American Journal of Obstetrics and Gynæcology; Surgery, Gynæcology and Obstetrics.

French.—La Gynécologie; Gynécologie et Obstétrique; Bulletin de la Société d'Obstétrique et de Gynécologie de Paris, etc.

Italian.—Annali di ostetricia e Ginecologia.

German.—Archiv für Gynäkologie; Monatsschrift für Geburtschülfe und Gynäkologie; Zeitschrift für Geburtschülfe und Gynäkologie; Zentralblatt für Gynäkologie; Muenchener medizinische Wochenschrift.

It is hoped that the Review of Current Literature will keep the readers of this Journal in touch with all current work throughout the world. At the end of each year it is proposed to print an Index of all the subjects contained in the articles of the above journals. Arrangements will also be made to include abstracts of important articles on border-line subjects, such as Physiology, Biology and Biochemistry.

LIST OF ABSTRACTORS.

London.—MALCOLM DONALDSON, F.R.C.S.; A. C. PALMER, F.R.C.S.; L. DOROTHEA TAYLOR, M.D.

Birmingham.—LEWIS GRAHAM, F.R.C.S.; HILDA N. SHUFFLEBOTHAM, F.R.C.S.

Coventry.—G. G. ALDERSON, F.R.C.S.

Manchester.—F. H. LACEY, M.D.; W. R. ADDIS, M.B.

Sheffield.—W. W. KING, F.R.C.S.

Description of a new operation for Cæsarean section. JONES, ARNOLD (*The Lancet*, June 16, 1921, p. 75) has devised what he describes as a form of gridiron incision for opening the uterus. The incision is based on the fact that there are three layers of uterine muscle; the outer layer with its fibres running transversely; the middle, which contains the vessels, with its fibres runing longitudinally, transversely and obliquely, with no particular arrangement; and the inner, arranged as two hollow cones with their bases joining at the middle of the body of the uterus, and their apices surrounding the orifices of the Fallopian tubes. In the pregnant uterus, the outer and middle layers are easily differentiated. First, the external layer of uterine muscle is incised transversely, the incision being on the anterior wall just below the centre of the body. To start the incision Jones makes a small V exactly in the middle line and about one-eighth of an inch into the muscle; this V facilitates accurate apposition in stitching later. A pair of blunt-pointed, straight scissors is inserted into this and passed transversely under the superficial layer of muscle, first to one side and then to the other. The scissors pass easily and leave a tract between the two layers. The superficial layer is then incised along this tract. It is necessary to carry this incision the full distance across the front of the uterus,

The superficial layer is then peeled from the middle layer upwards toward the fundus. This is easily and quickly done. The middle layer is now exposed and the large tortuous vessels it contains are plainly seen. The middle and inner layers are now incised longitudinally, and the line of incision selected which seems most clear of blood vessels. After the fœtus and placenta are delivered the uterus is sutured. The longitudinal incision is closed by a continuous No. 4 catgut suture, and the transverse incision in the same manner. Jones' experience with eight cases has been that the bleeding is distinctly less than with the ordinary incision. The stripping of the outer layer is almost bloodless. The scar resulting from the incision is like an inverted T; the principal scar through the middle and inner layers being covered by a flap of the external layer, the scar of which is the cross member of the T. Jones is of the opinion that the resulting scar should greatly diminish the risk of rupture. EARDLEY HOLLAND.

Surgery, Gynæcology and Obstetrics.

xxxii, 5, *May*, 1921.

1. *Transplantation of the ureters into the large intestine in the absence of a functionating urinary bladder. R. C. COFFEY.
3. Immunity in surgery. G. E. ARMSTRONG.
4. Acute intestinal obstruction. J. M. T. FINNEY.
5. Obstructions of the colon and ileo-cæcal region. C. H. PECK.
6. Enterostomy in the treatment of acute intestinal obstruction. J. E. SUMMERS.
7. The toxic agents developed in the course of acute intestinal obstruction and their action. H. B. STONE.
9. *The diagnosis and treatment of chorioepithelioma. S. H. GEIST.
10. *Primary ovarian and primary abdominal pregnancy—their morphological possibility; report of a case of each. H. M. RAY.
11. Repair of partial and complete lacerations of the perineum. A. GOLDSPOHN.
12. Normal separation of the placenta. O. FRANKL.
16. *A new procedure in the treatment of eclampsia. H. J. DAVIDSON.

Transplantation of the ureters into the large intestine in the absence of a functionating urinary bladder. In the course of some experimental work Coffey found that the bile duct when implanted into the bowel became dilated by intra-intestinal pressure. This led him to the consideration of ureteral implantation, and he has devised a method of grafting the ureter into the large intestine in such a way as automatically to close the ureteric lumen when the intestine becomes distended with gas or fæces.

The author describes his method in detail, the essence of which is that the ureter shall be made to run a comparatively long submucous course in the intestinal wall before opening into the bowel. He has had four cases in which function afterwards seemed to be perfect.

The diagnosis and treatment of chorio-epithelioma. Samuel Geist had tried, from the study of fourteen cases of chorio-epithelioma, to formulate pathological data upon which surgical treatment can be based. In the main, the author's investigations have led him to endorse the views put forward ten years ago by Ewing. This authority classified " chorioma " into chorio-carcinoma, chorio-adenoma, syncytioma, and syncytial endometritis. Under this classification chorio-carcinoma was described as a highly malignant

and generally fatal growth characterized histologically by the absence of villi and the intense invading overgrowth of the plasmodial and Langhan's cells. Geist thinks that this prognosis is unduly pessimistic, for he has had six out of nine cases of this type with recovery following operation. In addition he has found cases of typical chorio-carcinoma with a few well preserved villi. He interprets these as remains of the pre-existing pregnancy and not as part of the new growth *per se*.

Chorio-adenoma is a much more benign growth which rarely, if ever, produces metastases. A microscopical diagnosis of this group may be made when there is a rather orderly arrangement of branching buds of vacuolated syncytium and sharply defined Langhan's cells. Villi are usually present. Geist cannot accept this pathological picture as defining a separate group and looks upon chorio-adenoma as described by Ewing as a transition stage between chorio-carcinoma and syncytioma. Syncytioma, according to Ewing, is an almost benign growth composed of plasmodial and large acidophile cells resembling syncytial wandering cells. Geist agrees with this description of syncytioma and believes it to be a very clearly defined group.

A further subdivision of chorio-epithelioma was made by Ewing, which embraces those cases in which the growth is localized or where there is diffuse infiltration of the uterine wall by giant syncytial cells. He termed this type of case "syncytial endometritis," while Geist, with reason, prefers the name "syncytial hyperplasia."

The author's views as to treatment may be summed up by saying that simple curetting is sufficient for cases of syncytial hyperplasia and for some cases of syncytioma, while abdominal hysterectomy is always indicated in chorio-carcinoma.

Primary ovarian and primary abdominal pregnancy—their morphological possibility. (Report of a case of each.) Up to the present there have been at least twenty cases of primary ovarian pregnancy which have been conclusively proved by microscopic examination. From the analysis of all the previous cases and his own specimen the author states that it is apparent that considerable variety occurs in the embedding of the blastocyst in the ovary, more especially in respect to its relations to the corpus luteum. All observers agree that the lutein cells do not play the part of decidual cells. There are two possible sites in which an ovum impregnated within the Graäfian follicle may become embedded—namely, upon the young connective tissue within the follicle, or just external to the layer of lutein tissue where conditions are more favourable on account of the richer blood supply.

Ray reports the following case of ovarian pregnancy:—

The patient, aged 38, had been married two years, had had no children, but one miscarriage. Three weeks after her period she was seized with intense abdominal pain which radiated to the perineum and rectum and which caused her to faint. There was no discharge of blood or other material from the vagina.

At operation the abdominal cavity was distended with fluid and clotted blood; the right appendages were normal; the left tube was slightly œdematous but otherwise completely intact; milking brought no fluid from the fimbriated extremity. The ovary was replaced by a large, globular, hæmorrhagic mass enclosed in a thin capsule which was broken in several places allowing the protrusion of blood clot.

Microscopical examination of sections of the hæmorrhagic mass revealed numerous chorionic villi embedded in the stroma of the ovary. There was a number of scattered syncytial masses and large islands of swollen, richly chromatic cells identical with those of the trophoblast. Several of the sections showed portions of the corpus luteum separated from the villi by a thin layer of blood clot, connective tissue and ovarian stroma. Nothing resembling a true decidua was seen, but a peculiar "decidual change" in the connective tissue of the ovary and in the walls of the blood vessels was very marked. Sections of the tube showed slight congestion and œdema. The inner third of the tube revealed evidence of chronic obliterating salpingitis.

The author's case of primary abdominal pregnancy is reported as follows:—

A single woman, aged 24, was admitted to hospital five days after a normal period on account of acute abdominal pain followed by fainting. There was a hæmorrhagic vaginal discharge. She emphatically denied the possibility of pregnancy. Laparotomy revealed free blood in the peritoneal cavity. The tubes and ovaries on both sides were absolutely normal. On the anterior surface of the uterus just above the internal os was found a ragged hæmorrhagic area the size of a pea. A probe could not be passed into the uterine cavity. It was thought to be a new growth and excised.

Microscopical examination on the uterine surface of the tissue revealed normal myometrium which, as the peritoneal surface was approached, became looser and engorged with blood vessels. Here and there "decidual changes" in the connective tissue and in the walls of the blood vessels were noted. At the periphery and actually implanted upon the myometrium were numerous typical and well preserved chorionic villi.

In arriving at a diagnosis on primary abdominal pregnancy three possibilities had to be eliminated.

(1) Abortion with perforation of the uterus and protrusion of placental tissue is excluded by the author on the grounds of the patient's denial that she was even aware that she was pregnant and the mechanical difficulty, if not impossibility, of perforating the uterus in the region of the pathological process.

(2) A perforating chorio-epithelioma is considered impossible as curettage produced only normal endometrium, and the myometrium nearest to the uterus was free from chorionic villi.

(3) Tubal abortion with secondary implantation on the peritoneum of the anterior uterine wall. The evidence against this hypothesis is that the tubes were absolutely free from any evidence of pregnancy gross or "microscopic." (There is no previous mention that the tubes either had been removed, or were examined microscopically.)

A bibliography is appended.

A new procedure in the treatment of eclampsia H. J. Davidson describes a new procedure which he has adopted with gratifying results in the treatment of eclampsia. He has discarded all methods of inducing perspiration by the application of hot packs, etc., and has substituted the introduction of a litre to a litre-and-a-half of water into the stomach by means of a tube. This procedure is repeated every four hours, and an ounce of Epsom salts is introduced once or twice in the twenty-four hours. He finds that the

fluid is seldom regurgitated, that diuresis and intestinal peristalsis are stimulated, and that the patient is not debilitated as by hot packs.

As a final admonition he urges that at least three gastric lavages be performed in all severe cases *after* the patient is considered well out of the critical stage to secure against the recurrence of the convulsions.

W. W. KING.

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2. Post operative massive collapse of the lung. F.A.C. SCRIMGER, M.D., F.A.C.S., Montreal.
4. Focal infections with metastatic manifestations; with special reference to gonorrhœal arthritis. JOHN H. CUNNINGHAM, M.D., F.A.C.S., Boston.
5. *Present status of the treatment of operable cancer of the cervix. WILLIAM P. GRAVES, M.D., F.A.C.S., Boston.
6. *The present position of radium in the study and treatment of uterine cancer. WILLIAM S. STONE, M.D., New York.
7. *The sequelæ and later aspect of the toxic albuminurias of pregnancy. HAROLD K. GIBSON, M.D., Chicago.
9. Angioma of the placenta; with pathological report and microphotographs by Dr. Frank B. Mallory, Director, Pathological Laboratory, Boston City Hospital. JOHN T. WILLIAMS, M.D., F.A.C.S., Boston.
11. The influence of syphilis upon the pregnant woman. GEORGE GELLHORN, M.D., F.A.C.S., St. Louis.
14. The importance of a thorough exploration of the intra-abdominal organs in operations for epigastric hernia. RICHARD LEWISOHN, M.D., F.A.C.S., New York.
15. A clinical study of the placenta. JOHN E. TALBOT, M.D., Worcester, Massachusetts.

DEPARTMENT OF TECHNIQUE.

16. The treatment of prolapse of the urethra; with report of a case. GEORGE P. LIVERMORE, M.D., F.A.C.S., Memphis, Tennessee.
17. A thread retaining needle. DUFF S. ALLEN, M.D., St. Louis.
18. Surgical post operative treatment. R. V. B. SHIER, M.D., Toronto.

The present state of the treatment of operable cancer of the cervix. In discussing the relative value of operation and radium in the treatment of cancer of the cervix, Dr. Graves epitomises the state of affairs as follows:—"The problem that confronts us at the present moment is not with regard to the general value of radium in relieving symptoms and prolonging life: the specific question is, whether we are justified in resorting to the simple application of radium in cases that are frankly operable, and in which an ultimate cure by surgical means is reasonably possible. The question is now at a critical stage, and will eventually be settled one way or the other by those who, with the courage of their convictions, are already treating with radium cases which would formerly have been subjected to operation. Meanwhile the frank testimony of everyone who is seeing and treating many cases of cancer of the cervix has a certain amount of value, and it is with the hope of contributing something to the general information on the subject that the personal experience of the writer is offered." In dealing with his earlier results Dr. Graves says:—"Of the inoperable and borderline cases sent from the Free Hospital for Primary Radiation none were permanently cured, though some passed through a brilliant period of apparently complete disappearance and cessation of the disease.

Several inoperable cases made operable by radiation were subjected to radical surgery, and with the exception of one patient who died from operation they usually lived many months in comfort until fatal recurrence took place.

A number of cases of local recurrence following radical operation was treated with radium and two of these deserve special mention. In one the treatment caused the disease to disappear, but resulted in a large vesico-vaginal fistula, which after two operations was permanently closed. The patient lived three years after the radiation treatment and five years after the radical operation, the cause of death not being ascertained though it was probably a recurrence.

The second case developed a local recurrence five years after an extended operation. Radium treatment at the Huntington Hospital was followed by an intense local and constitutional reaction. The patient recovered, unexpectedly escaping a fistula, and is now entirely well six years after the radium treatment and eleven years after the original operation. Prophylactic treatment following operation after several trials was given up on account of the danger of burns and later fistulæ.

In 1916 the Free Hospital acquired 100 milligrams of radium. Similar results have followed, except that the danger of over-dosage, too frequent application, and inadequate screening have been learned, fistulæ have become less common and have now almost but not completely disappeared. "A statistical report of our personal results in the use of radium would be too complicated to include in a paper of this kind, comprising as it does not only cases in which radium was the primary and sole method of treatment, but all kinds of combinations in which it was used in conjunction with surgical operation, or with various other palliative forms of treatment. Our results have been characterized by numerous surprising temporary cures, sometimes extending over many months, but eventuating finally in rapidly growing recurrences. In many of the cases the disease was, from an operative point of view, hopelessly extensive when first seen.

The pre-operative treatment of borderline cases, as a preparation for operation, has proved, for the most part, disappointing. The post-operative application of radium following radical operation during which the disease has not been completely extirpated, has in most instances, undoubtedly been instrumental in prolonging the patient's life in comparative comfort.

Two such cases now under observation nearly a year and a half after operation, are perfectly well without palpable signs of disease. Previous experience, however, leads us to believe that in both cases recurrence will probably eventually appear.

The logical outcome of our experience is that in view of the uncertain and sometimes treacherous behaviour of radium in the treatment of inoperable cases, we have not felt justified in substituting it for radical surgery in cases favourable for operation."

Dr. Graves's figures and those of his associate, Dr. F. A. Pemberton, are quoted from 1909, the year of their radical operation.

189 cases of cervical cancer were seen; of these 119 were subjected to radical abdominal operation, giving an operability percentage of 64 per cent., allowing for cases which refused operation. The immediate mortality rate was 5 per cent. The 5-year curability percentage is 27.6 to 34.2 per cent. according to the method of computation, while the absolute curability rate is 16.8 to 18.5 per cent.

The present position of radium in the study and treatment of uterine cancer. "So much evidence has been furnished of the value of radium in the treatment of uterine cancer that the question is arising whether it is not more effective than operation.

We find in the uterus the same kind of response of tumour tissue to radiation as in other parts of the body. The embryonal and rapidly growing types are regularly the most responsive: the glandular type more so than the epithelial, and in both the papillary and less infiltrating are much more responsive than the deeply infiltrating variety. According to the amount of radium, its filtration and distance of application, the tumour cells of certain very glandular types may degenerate and disappear without other visible changes: or, in other less cellular types, an excessive plasma cell and lymphocytic invasion is accompanied by a connective tissue proliferation and a subsequent smooth and supple fibrosis, which, by encompassing partly or completely degenerated tumour cells, becomes an important factor in the reparative process.

Because of excessive dosage or the use of a large amount of β-radiation, this reaction may extend in an undesirable degree to even the neighbouring normal tissues, altering their nutrition or causing their necrosis, because of which the reparation is either postponed or entirely prevented.

Clinical reparation follows such histological changes in tumours of the uterine cervix with such regularity that this agent appears to have almost a specific effect. Our studies of tumours of the cervix have led us to hope that the presence of certain histological types, which have hitherto not been recognized as having any clinical importance, may be found to be the reason for the regularity of the favourable action of radium.

We have observed for example a few cases that correspond to the basal celled type of epithelioma, which is regarded among radiologists as uniformly susceptible to radio activity. We also often find the so-called flexiform type of epithelioma, in which the entire epithelial layer is reproduced, often producing a tumour of essentially papillary type, and one in which the lymph-node invasion is late. This type appears to be especially susceptible to radium, although it is difficult to demonstrate by actual statistics, because of the advanced stage which so many of the cases present." In the frequency of this type, there is also suggested a reason for the comparative infrequency of lymph-node invasion in cancer of the uterine cervix. The writer, from the observation of the effects of radium in over 400 cases of uterine cancer and from the study of its effects on tissues in other parts of the body, offers the present therapeutic position of this agent in uterine cancer to be as follows:—

Radium, in all recurrences, though less effective than in primary lesions, produces immeasurably better results than operation, provided they are not too far advanced, and are not so closely related to the bladder or rectum that to cause their regression will produce fistulæ or severe functional disturbances.

It is impossible to define the limits of the growth beyond which the use of radium is undesirable, but it is essential in order to retain good results to treat cases in the early stages, and, in general, good judgment demands that treatment shall cease within narrower limits of growth than is the case with primary lesions. In numerous instances, however, pain may be relieved, haemorrhage stopped, and the progress of the growth hindered by one carefully adjusted dose, when the advanced stage of the tumour precludes the idea of a considerable regression.

Occasionally also a recurrence in the less accessible parts of the pelvic tissues may be favourably affected by means of cross-fire radiation. For this purpose it is desirable to use a large amount of heavily filtered radium in the vaginal vault and above the abdominal wall, or, in the latter location, X-ray may be substituted. The embedding also, of small tubes in deep tumour tissue without filtration and containing emanation of small radioactive value is gaining results which justify the hope that present results may be improved.

For all cases of primary uterine cancer, with few exceptions, radium should be regarded as the method of choice. Of 34 cases, representing 25 per cent. of 139 patients who applied to the Memorial Hospital for treatment within three months after the beginning of symptoms, a primary and complete regression was obtained in 16, or 47 per cent., and a partial, but substantial regression in all the remainder.

Of the 16 cases in which the regression was complete the growth was limited apparently to the uterine tissues in 3, and in the other 13 the extra-uterine involvement was not extensive. Of another 34 cases who applied for treatment within 4 to 6 months after the beginning of symptoms the disease was considerably more advanced. There were 3, however, in which the growth was apparently limited to the uterine tissues, and in all a complete regression was obtained. In 18, or over 50 per cent., although the involvement of the extra-uterine tissues was considerable and the regression could not be regarded as complete in any, the disappearance of symptoms and the restoration to normal health were evidence of the value of the treatment. An improvement followed the treatment in the majority of the others. There was no improvement in a few, and in two cases the patients were, perhaps, made worse.

In forming an estimate of the permanency of the primary results, the action of radium upon the tissues extends over such long periods, six or more months, that it is idle for the purpose of statistical study to define the condition of a case until at least a year after treatment.

Without the knowledge also gained by operation it is difficult to define results as measured by the extent of the original lesion.

There are numerous cases in this series who are apparently well two or more years after the treatment has been made. It is in the field of the so-called borderland cases, the writer believes, that radium has demonstrated its remarkable value. With a properly adjusted dose and form of application radium may be expected regularly to destroy all intra-uterine tumour tissue, and it is capable of destroying extra-uterine tumour tissue to a depth fully within the limits of what is generally regarded as operable, with more certainty than operation. We know that cases judged to be outside the limit of operability are frequently made to appear to be well within such limits after the use of radium, and the limiting of the field of operability by surgeons who are only using a comparatively small amount of radium salt, gives ample confirmation to this opinion. The question of operating in this type of case after radium has produced an apparent retrogression must await the reports of final results, but the histological changes that radium produces in the extra-uterine tissues show that such a procedure is probably erroneous.

The presence of tumour cells in the extra-uterine tissues after treatment can only be definitely known by means of the microscope and the encasement of such cells by a fibrous framework will be destroyed by the knife,

and the cells will thus be given a chance of renewing the former activity. There is naturally a tendency on the part of surgeons to use radium as an adjunct to operation instead of a substitute, either in advanced cases after removal of as much growth as possible, or prophylactically, in early cases immediately after operation has removed all gross evidence of disease. In the first instance the writer thinks its use should be discouraged.

As a prophylactic measure in early cases, though not so efficient as when used prior to operation, its use should be encouraged, either by X-ray or radium over the abdominal wall or by insertion of a radium capsule in the vaginal vault within a rubber tube, or the gauze that may be used for drainage, or by both portals. The radium should be heavily filtered and considerable caution should be used against injury to the pelvic tissues. It is too early to predict the advantage which will result from this use of radium.

There remains the question of substituting radium for operation in those few cases in which the tumour is plainly limited to the uterine tissues. In the discussion of this question cancer of the body must be considered separately because of its special anatomical features. The inability to locate accurately the site and extent of the lesion makes the dose and amount of filtration a matter of guess-work.

Lymph-node invasion is also more of a factor than in cancer of the cervix, and the sparks, so to speak, may fly far and wide. Two unfortunate experiences in which recurrence followed radium treatment in what appeared to be early lesions led the writer to believe that, for the present, at least, radium cannot be regarded as a safe substitute for operation. The writer believes that the application of radium one to two weeks prior to operation will materially improve the results that have hitherto been obtained by operation alone.

The sequelæ and later aspect of the toxic albuminurias of pregnancy. The scope of this paper does not include any discussion of the symptomatology of this group of affections beyond an attempt to convey a picture of the symptom complex upon admission to hospital, and the renal findings and arterial tension upon discharge, for the purpose of deductions relative to the latent morbidity and subsequent pregnancy.

All functional kidney tests and blood chemistry based upon the theory of an alteration in the nitrogenous metabolism have been purposely omitted from the tabulation, it being the personal conviction of the writer that they are of relatively slight prognostic value in the determination of an impending eclampsia, indeed too many valuable hours have been lost in securing a normal blood nitrogen and phthalein functional test in the face of an impending eclampsia.

Few conditions confront the obstetrician in which the element of time, even hours, may be as vital as in the rapidly increasing hypertension with albuminuria in the pregnant woman.

Of interest upon the clinical side of eclamptic and pre-eclamptic cases the frequent manifestation of visual disturbance, though only two of these cases showed any changes in the background of the eye.

As concerns the frequency of toxic albuminurias of pregnancy one gathers from the literature that it lies between 2 and 3 per cent.

The obstetrician who essays carrying the parturient woman, suffering perhaps from a slight œdema and albuminuria, to term or to the more often

disappointing " viability," will not infrequently find himself beset with difficulties should he premise his course upon any known clinical data.

These difficulties, it would appear, are largely due to our inability to differentiate clinically the transition from the purely degenerative changes in the parenchyma of the kidney to the inflammatory, corresponding to those abrupt changes in the symptom complex. And yet upon our inability so to differentiate lies perhaps our greatest obstacle in the prevention of eclampsia with its yet considerable mortality and morbidity.

Upon the clinical side, however, there is an unmistakable trend toward the belief that the significance of an existing and persisting arterial hypertension cannot be over-estimated; indeed, many investigators believe that it is the line of cleavage between the purely degenerative and inflammatory processes. Queirel, in an article upon arterial hypertension in pregnancy, makes the dogmatic statement that if in a pregnant woman with previously normal tension the hypertension reaches 180 or 190 and persists, an eclampsia is imminent.

It becomes evident from a study of contemporary literature that a continuation of the kidney begun in pregnancy has not been given the consideration which its importance justifies, and existing literature shows a striking variation of opinion among those who have written on this subject. Against the probability of the continuation of the kidney begun in pregnancy we find Whitridge Williams, who believes that chronic renal diseases rarely results from pre-eclamptic toxæmias, and that if recurrence takes place in a subsequent pregnancy the subject belongs to the nephritic type of the toxæmias of chronic nephritis.

Rosenstein and Esch believe it exceedingly rare. For the probability we find Zangmeister, von Jaske, and Koblanck, who demonstrated a chronic nephritis in 6.5 per cent. of his 77 cases examined post-partum. Koblanck's cases were all examined within a period of six months post-partum, a factor calculated to give a more favourable status than a later examination. In all the authors' cases one year had elapsed prior to final examination. A general survey over material [30 cases are dealt with in the paper] shows 3 cases dead at 1, 5 and 8 years respectively, 1 of unknown causes, 2 of renal and cardio-renal affections. Of 14 remaining eclamptics 5 had a well-marked nephritis and hypertension, and 2 an arterial tension suggestively high.

Of the 3 " abruptios," a condition Zangemeister believes does not exist in the absence of a chronic nephritis, it is of note that Case 4, after two exceedingly severe albuminurias with hypertension, show no clinical evidence of a nephritis.

Of paramount importance to the obstetrician is the question of recurrence in a subsequent pregnancy, for he will frequently be questioned relative to the hazard of a future pregnancy.

That prematurity is the most frequent complication of the entire group of the toxic albuminurias is axiomatic.

" In a post-partum study of 23 eclamptics Wolff and Zade found 8 of the 23 pregnant for the second time. Four of the 8 showed distinct renal disturbance, 2 of these repeating their eclampsia. Of our 27 cases who have survived to the present time, we find 7 with a subsequent pregnancy, probably a fair percentage when we consider the character of the first pregnancy. Of the 5 whose pregnancy has terminated, 4 were discharged from hospital at the termination of the first pregnancy with an absence of

casts and albumin and a normal arterial tension. Of these we find one "abruptio" at the end of the sixth month, with accompanying albuminuria, casts, hypertension and visual disturbance, one premature delivery with hydramnios, albumen and hypertension, one moderately severe albuminuria with some hypertension, one operative delivery indicated by rapidly increasing tension and albumin. The fifth—Case 15—discharged after former labour with blood pressure of 116—84, no albumin and no casts, was again admitted at 7½ months with a tension of 186—90, albumin +, granular and hyaline casts. She developed spontaneous labour with delivery of a 4½ pound infant.

Two remain undelivered, Case 25, an "abruptio," now in the fourth month of her second pregnancy with a tension of 148—88 but no albumin or casts, and Case 17, a previous eclamptic, now in the fifth month of her second pregnancy, with a tension of 152—84, also without albumin or casts.

In the interval between first and second pregnancies none of these women, with the exception of Case 15, gave a complex at all suggestive of chronic nephritis, all evidence of cardiac and renal pathology being absent.

In conclusion I would like to express the conviction that freedom from albuminuria with a normal arterial tension following a toxic albuminuria in the course of one pregnancy is by no means a sure criterion of its non-occurrence in a subsequent one. As to the wisdom or expediency of a subsequent pregnancy in this group of affections one may say possibly it may be permitted after a protracted interval of normal arterial tension and freedom from any evidence of renal incapacity, and after due consideration to the three outstanding hazards: (1st) irreparable damage to kidney and heart, (2nd) prematurity, (3rd) eclampsia.

Personally, in view of our limited knowledge of the nature of this entire group of affections, I can find no justification for placing a woman in jeopardy a second time, for although the etiology and nature of eclampsia is obscure, the mortality and morbidity are by no means so."

A. C. PALMER.

Bulletin de la Soc. d'Obstétrique et de Gyn. de Paris et des Sociéties et Réunions Obstétricales, &c.

SOCIETY OF OBSTETRICS AND GYNÆCOLOGY OF PARIS.

No. iv, 1920.

MEETING, *June*, 1920.

1. *Two cases of retinitis in pregnancy, without increase of the nitrogenous constituents of the blood. M. COUVELAIRE.
2. Note concerning the peculiar attitude of a fœtus in utero (extension of legs with cephalic presentation). M. METZGER.
3. Obstruction due to a tumour of the sacro-iliac articulation. M. BRINDEAU.
4. Presentation of an acephalic and acardiac monster, consisting of a pelvis and pair of legs. M. GUENIOT.
5. Institution of a clinic for syphilitic cases in the Baudelocque Lying-in Hospital. M. COUVELAIRE.

SOCIETY OF OBSTETRICS AND GYNÆCOLOGY OF BORDEAUX.

MEETING, *April* 1920.

1. A case of paralysis of one leg, appearing the day after confinement. MM. P. BALARD and MARC RIVIERE.
2. A case of diffuse encephalo-myelitis during the puerperium. M. ANDERODIAS.

3. *Spontaneous delivery after a Cæsarean operation. MM. P. Balard and Marc Riviere.

SOCIETY OF OBSTETRICS AND GYNÆCOLOGY OF LILLE.

Meeting, *October 30th*, 1919.

1. Fibromyoma of uterus presenting. Cæsarean operation at commencement of labour. M. Vanverts.
2. Bilateral cephalohæmatoma. M. Vanverts.
3. Twin pregnancy complicated by acute hydrominas of one ovum. Induction of abortion. M. Paquet.
4. Rupture of a gravid uterus two years after a hysterotomy for a brow presentation. M. Paquet.
5. Sigmoiditis and parasigmoid abscess complicating pregnancy. Subacute peritonitis found post mortem.

SOCIETY OF OBSTETRICS AND GYNÆCOLOGY OF LILLE.

Meeting, *Dec. 18th*, 1919.

1. Methods of infant feeding and infant mortality among the working classes. M. Vanverts.
2. Perforation of an infected uterus by the tranvserse branch of a T-shaped drainage tube. MM. Vanverts and Paquet.
3. Fibromyoma and retained infected placenta, currettage, perforation of uterus, hysterectomy, recovery. M. Paucot.

SOCIETY OF OBSTETRICS AND GYNÆCOLOGY OF MONTPELLIER.

1. Brow presentation. Mme. Gaussel.
2. Artificial incubation. MM. Pech and Madon.
3. Hæmatocele in an ectopic gestation. M. de Rouville.
4. Measurement of maximum respiration at the end of pregnancy, and after confinement. MM. J. Pech and J. Madon.
5. Wassermann reaction in pregnancy. M. Paul Delmas.

SOCIETY OF OBSTETRICS AND GYNÆCOLOGY OF NANCY.

1. Two cases of twin pregnancies, one fœtus papyraceus in each case. MM. Adam and Vermelin.
2. A case of prolonged retention of an aseptic placenta. M. Barthelemy.
3. Combined hydrorrhœa of the decidua and amnion. M. Job.
4. Endothelioma of ovary in a child of ten years. M. Hamant.
5. Two observations of congenital malformation of the vagina.

SOCIETY OF OBSTETRICS AND GYNÆCOLOGY OF BORDEAUX.

Meeting, *May 18th*, 1920.

1. Malignant tumour of the ovary and peritoneum. MM. Begouin and Bardon.
2. Premature induced labour in a case of contracted pelvis. Death of fœtus from meningeal hæmorrhage. M. Anderodias.
3. Two cases of meningeal hæmorrhage in the new-born, following spontaneous delivery in a contracted pelvis. MM. P. Marc Riviere and P. Ballard.
4. A case of colossal hypertrophy of a syphilitic placenta. M. Marc Riviere.

Retinitis without increase of the blood nitrogen. M. Couvelaire reports two cases of retinitis.

The first patient had had a previous pregnancy. The uterus had fibromyomata. Bilateral retinitis appeared at the fifth month. Complete blindness. Albuminuria (2 grammes) appeared after the eye symptoms. Arterial

blood pressure 23—16. Nitrogen of the blood 0.48 per cent. Fœtus died in utero five or six weeks after the onset. Two months after expulsion of a macerated fœtus the albuminuria and high blood pressure entirely disappeared, and the patient made a complete recovery.

The second patient was pregnant for the third time. Previous pregnancies had been quite normal. The onset was sudden, at the fourth month. Complete blindness, bilateral retinitis, albuminuria (2 grammes). High blood pressure, 24—15. Nitrogenous contents, 0.30 to 0.48 per cent. Abortion induced. Living fœtus born 12 days after the onset of the disease. Recovery complete two months later, with disappearance of albumen and of high blood pressure.

These two cases of retinitis developed early in pregnancy, which is not usual—only 18 per cent. having been observed before the sixth month.

The absence of œdema in these cases was remarkable. In one case the albuminuria followed the retinitis. It is obvious therefore, that albuminuria is not the only sign that should be looked for; the blood pressure, quantity of urine, etc., should also be noted.

Rochon-Duvigneaud reported a case with the blood nitrogen 0.18 per cent. five days after the birth of an eighth month macerated fœtus, when the retinitis was at the maximum.

It is desirable that cases of retinitis should be carefully studied from the points of view of the nitrogenous content of the blood. In conclusion, the author considers that if there is not a very rapid response to treatment, abortion should be induced.

Spontaneous delivery after Cæsarean operation. M. Anderodias read a paper on the subject (Society of Obstetrics and Gynæcology of Bordeaux, April 1920) in which he quoted a case of Professor Potolui, in which a woman had her third pregnancy terminated by a Cæsarean section, owing to a shoulder presentation. The fourth pregnancy ended in a natural labour, lasting four hours.

His own case was that of a woman aged 22, who came to hospital to be examined with the history that she had had a Cæsarean section done for her first child, because the cervix was slow in dilating. On examination, she appeared to be a healthy woman of average height, and no signs of rickets. The abdomen showed a scar in the middle line from just above the symphysis to a short distance above the umbilicus. The scar was a healthy one. There was no obstruction in the pelvis. The author, therefore, decided to allow the patient to go into labour. The confinement was normal, except that the membranes were artificially ruptured when the cervix was fully dilated. The question the author put to the meeting was, whether there is any symptom during pregnancy that will show the state of the uterine scar?

In the discussion that followed it was agreed that there was no possible way of estimating the condition of the uterine scar. M. DONALDSON.

Gynecologie et Obstetrique, Revue Mesuelle.

No. 2-3, 1921.

1. Is the corpus luteum of pregnancy a cholesterin-producing organ? GROSS.
2. On the so-called placental infarcts and their relation to the albuminuria of pregnancy. RAYMOND HAFFNER.
3. On sarcoma and malignant myoma of the uterus. P. JACQUIN.

4. *Difficulties in diagnosis in rupture of the uterus. RAYMOND KELLER.
5. *Fibromyoma and pregnancy. MAURICE REEB.
6. Studies in the function of the ovaries (ovulation, corpus luteum and menstruation). G. SCHICKELE.

Difficulties in diagnosis of rupture of the uterus. Raymond Keller records his observations on eleven cases of ruptured uterus, noting the premonitory signs of threatened rupture: in five cases he noted marked tension of one round ligament, and in one case he noted that both round ligaments were equally markedly tense: in two cases Bandl's ring was noticed and tension of one of the round ligaments. In five cases there were no premonitory signs and the rupture occurred without one being able to foretell it.

He has come to the conclusion that the diagnosis of ruptured uterus cannot be made definitely unless the rupture can be distinctly palpated, or the fœtus can be palpated in the abdominal cavity directly under the abdominal wall and in a different position to that which it had previously occupied.

Keller noticed one important sign in three cases; a large fluctuating swelling in front of or to one side of the uterus and which may increase rapidly to an enormous size; this is due to rupture of blood vessels under the peritoneum.

Any other signs are only of relative value.

Fibroids and pregnancy. This is a report upon cases of fibroids complicating pregnancy; it has been noticed that complications occur less frequently in delivery at full term than in abortions.

All authors report more or less severe hæmorrhage in the case of submucous or deep interstitial fibroids: this hæmorrhage often needs treatment as the placenta cannot be expelled in the ordinary manner; during manual separation the placenta and membranes have been found more or less adherent, and when the placenta was inserted over the fibroid it was impossible in some cases to remove the placenta, and hysterectomy has had to be performed either on account of the hæmorrhage or to avoid infection; in only one case had the author to remove the placenta on account of hæmorrhage, this being a submucous fibroid.

During the puerperium it is the fibroids in the cavity of the uterus or near the cavity which cause complications such as subinvolution, repeated hæmorrhages, etc.; submucous fibroids have, during involution, become separated from the uterine wall and expelled per vaginam, and a fibroid with a pedicle may cause inversion of the uterus.

Trauma of a submucous fibroid during delivery may produce suppuration or gangrene by infection, and in this case vaginal hysterectomy is advised provided that the fibroid is not large; a fibroid may become adherent to the abdominal wall during pregnancy and so prevent the uterus sinking into the pelvis during the puerperium, or the fibroid may be torn from the abdominal wall by the involution of the uterus.

Usually during the puerperium fibroids shrink and in some cases very markedly, those shrinking most which have increased in size rapidly during pregnancy; submucous and interstitial change the most in size as they are the more vascular; according to Vautrin uterine contractions during labour and the puerperium may set up a rotary movement in an interstitial fibroid which detaches the fibroid from its capsule and tears the blood vessels and lymphatics across in such a manner that it becomes

a foreign body in the uterine wall and so deprived of its circulation. In some cases a fibroid may diminish slightly after delivery and then grow again more or less rapidly causing one to be suspicious of cystic or malignant degeneration.

It is advisable to watch the patient for some time longer than the usual puerperium so as to diagnose and treat any complications which may arise; in the absence of complications it is best not to interfere during the puerperium but to wait six or eight weeks when involution is complete, so rendering the operation much easier and less risky. F. H. LACEY.

Zentralblatt f. Gynäkologie.

No. 16, *April* 23, 1921.

1. *The indications for interrupting pregnancy in mental and nervous diseases. E. MEYER.
2. *The extraction of the shoulders. A. MUELLER.
3. Remarks on the occurrence of granulation tissue in vaginal and other gynæcological operation-wounds. O. FRANKL.
4. *A method of obtaining secretion from the female urethra. B. OTTOW.
5. Hollow glass pessaries. E. OPITZ.
6. *Alterations in body-weight at the end of pregnancy. R. BENDA.
7. Dosage in protein therapy. R. SALOMON and J. VOEHL.
8. Is there any active sex-determining substance in the corpus luteum? O. FELLNER.

Indications for interrupting pregnancy in mental and nervous diseases. Meyer has produced abortion in the following diseases, the indications being severe symptoms of the particular disease:—

α. *Organic Disease.*—(*a*) *Multiple sclerosis*, one case, marked improvement;

(*b*) *Encephalitis lethargica*, one case, death.

β. *Mental Disease.*—(*a*) *Dementia præcox*—late cases only (5 ex 42) were aborted and sterilized.

(*b*) *Melancholy of pregnancy*—severe cases (10 ex 31), without sterilization—great improvement.

(*c*) *Congenital Idiots* 3, all aborted and sterilized.

Delivery of the shoulders. A repetition of Müller's method first published in 1898. He avoids the bio-acromial diameter passing through the pelvis by drawing down first the anterior shoulder until it is outside the vulva and then delivering the posterior shoulder.

He quotes many eulogies expressed on his method since its first publication.

A method of obtaining secretion from the female urethra. The index finger of the left hand lies in the groove of a Sim's speculum inserted in the vagina to keep the labia away from the meatus. Then pressure from behind forwards is made by the index finger, and the drops as they escape from the meatus are collected on the platinum needle held in the right hand.

Changes in weight at the end of pregnancy. Benda refutes Zangemeister's statement that 98 per cent. of pregnant women lose an average of 1 kilo weight during last three days of pregnancy, and that loss of weight may be taken as a sign of the proximity of labour. He finds that in 63 per cent. of primiparæ and 83 per cent. of multiparæ the weight was either unchanged or increased.

No. 17, *April* 30, 1921.

1. *On interstitial glands. R. MEYER.
2. Total extirpation of the uterus and rejuvenation. W. LAHM.
3. Observations on vasoconstriction in pregnant women with kidney disease and high blood pressure. H. HINSELMANN.
4. *How is eclampsia relieved by bleeding? H. NEVERMANN.
5. *The use of quinine in obstetrics. W. STRAKOSH.
7. On criminal abortion. F. WEMMER.

On interstitial glands. Meyer, after examining ovaries from hundreds of fœtuses and babies, girls and adults, concludes that :—

(*a*) A special interstitial gland does not exist in the human ovary. Contrary opinions depend on false interpretations of sections through the theca of a follicle or from lipoids from dead follicles or corpora lutea.

(*b*) A " puberty gland " is without foundation.

(*c*) An ovary is not necessary for the development of secondary bodily and mental female characteristics.

(*d*) An interstitial gland does not exist in the uterus.

How is eclampsia relieved by bleeding? Nevermann observed the blood stream in capillaries during bleeding and decided the improvement was due to a mechanical effect, *i.e.*, the removal of venous blood filled with toxins caused a faster flow throughout the circulation. Blood pressure remained steady during the bleeding till the child was born.

The use of quinine in obstetrics. Intravenous injection of quinine at the end of the first stage produces at once sharp and effective contractions of the uterus. In case of heart disease it is safer to give the drug by mouth.

Zeitschrift für Geburtschulfe und Gynäkologie.

lxxxiii, No. 1, *December*, 1920.

1. *On menstrual blood. Prof. M. STICKEL.
2. On embolic and thrombolic gangrene of the limbs. M. PENKERT.
3. On the early diagnosis of chorion epithelioma. K. FINK.
4. *On ovulation, corpus luteum and menstruation. F. TSCHIRDEWAHN.
5. On true human hermaphrodites. Prof. O. POLANO.
6. On the permanent result of the one-sided Alexander Adams operation. MITTWEG.
7. *On hyperemesis gravidarum. J. MACK.
8. *On abdominal Cæsarean section. H. MARTIUS.

On menstrual blood. Professor M. Stickel and Dr. B. Zondek describe the examination and analysis of menstrual blood. They conclude that the absence of coagulation is due to a secretion of the endometrium, since blood from the cavity of the uterus did not coagulate, while blood obtained by puncture of the uterine wall showed a normal coagulation time. They found the fragility of the red corpuscles normal.

On ovulation, corpus luteum, and menstruation. F. Tschirdewahn deals with 80 cases of laparotomy undertaken at various stages between and during menstruation, in which the stage of development of the corpora lutea were observed. He concludes that the ovum is discharged between the 10th and 26th day after the commencement of menstruation. While the ovum

passes through the tube the developing corpus luteum by its internal secretion produces the pre-menstrual phase of the endometrium. If the ovum is not fertilised the corpus luteum shrinks, and the endometrium which no longer receives its stimulus degenerates and menstruation results.

On hyperemesis gravidarum. Mack discusses the various theories which have been advanced during the last century to explain hyperemesis gravidarum, and groups them under the headings (1) reflex, (2) functional neuroses, (3) toxic. He finds that very few cases come under the first heading. In the years 1904—1919, fifty cases were treated in the Giessen Clinic and in none was a reflex cause found. Eleven cases came under the second heading with definite hysterical signs, and the remainder were assumed to be toxic in origin.

On the assumption that a toxin produced by the fœtus or placenta is the cause of hyperemesis gravidarum Mack suggests the use of serum from normal cases of advanced pregnancy in the treatment of these cases, since normal cases must have become immune to the same toxin. He also quotes Freund, who says that the serum from non-pregnant women, men or animals works equally well, so that the action cannot be specific.

The routine treatment with isolation, rest and diet is described, and as a last resort the termination of pregnancy is advised.

On abdominal Cæsarean section. During the years 1912 to 1919 one hundred and thirty Cæsarean sections were performed in the Bonn clinic, and in an interesting article Dr. Martius gives a detailed analysis of the various methods employed and of the results. The total maternal mortality was 7·3 per cent., and of the cases nearly half were operated on after the rupture of membranes, some as long as 100 hours after.

The technique included the extra-peritoneal route in infected cases, and the intra-peritoneal operation with the uterine incision either (1) in the upper uterine segment, (2) in the lower uterine segment, and Cæsarean hysterectomy.

The extra-peritoneal operation was condemned as it gave a high proportion of bladder injuries, while with infected cases the risk of peritonitis was not less than with the intra-peritoneal operation. Dr. Martius favours the incision in the lower uterine segment on the grounds that there is less danger of future rupture of the scar, attributed to the lack of contractions in the lower segment; and less danger of intestinal adhesions and obstruction.

The only advantage of the upper incision is that the operation is an easier one.

Patients having Cæsarean section for the second time were almost all sterilized at their own request, although probably with modern experience this would not have been done so often.

With a true conjugate over 7 cm. the onset of labour was waited, and if the head did not show signs of moulding sufficiently Cæsarean section was performed.

With regard to pubiotomy all cases were multiparæ, but the results were not encouraging, only one case in seven escaping without complications. In spite of this the writer says that there are indications for its performance particularly when a speedy delivery is needed.

The results of premature induction of labour were not hopeful. The maternal mortality was higher than in cases treated on expectant lines,

while 30 per cent. of the children died. Other German observers are said to have much more favourable results with this method.

In the treatment of placenta prævia Cæsarean section gave good results to mother and child, and the writer hopes to see it used more frequently. The incision into the lower uterine segment was still advised, and no case of severe hæmorrhage or tearing of the lower uterine segment was seen.

L. D. TAYLOR.

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May 13th, 1921.

1. *A case of hunger œdema in an infant of three months. Prof. FRANZ HAMBURGER.

A case of hunger œdema in an infant of three months. The infant was breast fed up to a week off time of admission, but owing to deficiency in the supply of milk was put on a mixture containing equal parts of cow's milk and meal water without the addition of salt.

The child was emaciated and in poor condition. There was a swelling on the head resembling a cephalhæmatoma and œdema over both tibiæ.

Hot fomentations were applied to the swelling on the head and the infant put on a diet of two-thirds cow's milk, one-third water, eight per cent. oatflour, and ten per cent sugar.

In two days the swelling on the head had disappeared though the œdema was still well marked. In four days the weight had increased by 250 grammes, and in eight days the œdema was entirely gone.

Hamburger is of opinion that the condition is due to a quantative rather than a qualitative deficiency in the diet, and that a high salt percentage in the diet is not necessary to the production of the œdema.

May 20th, 1921.

1. *Bier's congestion in the treatment of puerperal mastitis. A. KRENKA.

Bier's congestion in the treatment of puerperal mastitis. A large glass bell, 12—15 cm. in diameter, exhausted by a hand pump, such as is used with Potain's aspirator, is employed.

The bell is exhausted until the breast assumes a dull reddish blue colour. At the end of five minutes air is admitted and a rest of three minutes allowed before the bell is reapplied. This is repeated six times at one sitting, and two treatments are given daily.

Pain in the breast indicates that exhaustion of the bell has been carried too far.

The most suitable cases are those in which localized pus formation has not occurred. Where there is pus formation incision is necessary, but a 2 cm. incision will suffice when the above treatment is employed.

Krenka claims that though treatment by this method is longer and there is a liability to the formation of foci during treatment from time to time, unsightly scarring and destruction of gland tissue are avoided, the infant can be put to the breast with advantage during treatment even where extensive pus formation has occurred, and lastly that it is much more pleasant for the patient than the method of radiating, incisions and breaking down of gland tissue by blunt dissection with the finger which he describes as the alternative treatment.